Spectrum and CBM-64 games tests

YOUR COMPUTER

Canada	C$	4.00
Denmark	DKr	35.00
France	Fr	50.00
Germany	Dm	8.50
Greece	Drs	290.00
Holland	DF.	8.50
Italy	L	4200
New Zealand	NZ$	3.70
Singapore	M$	6.25
Spain	Pts	[illegible]
Switzerland	SFr	7.00
U.S.A.	$	3.95

90p

OCTOBER 1984 BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE Vol. 4 No. 10

1984
WHO'S IN CONTROL — YOU OR YOUR MICRO?

WIN THIS NEW COMMODORE!
PLUS 4 AND 16 REVIEWS



YOUR COMPUTER Contents

OCTOBER 1984



Commodore Plus 4 review — page 52.



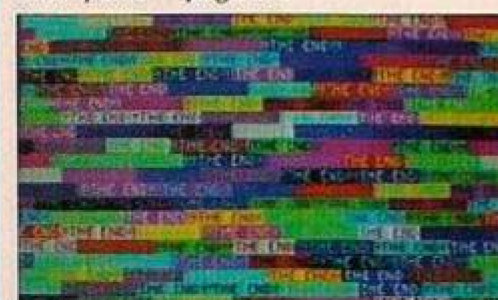
Spectrum Software — page 62.



Loona rescue — page 76.



Blockpaint — page 84.



Character print: page 113.

The front cover shows a scene from Virgin Films' 1984 starring John Hurt and the late Richard Burton.

Kokotoni Wilf

'Kokotoni Wilf' is an arcade adventure program whose undisguised intention is to steal the title of 'best arcade adventure program bar non' from Jet Set Willy. Kokotoni Wilf must recover all of the pieces of the legendary Dragon Amulet (which has been scattered through time) for his master the great magician 'Ulrich'. Throughout the quest Wilf comes up against many dangers from huge Prehistoric Dinosaurs to hostile alien Robots but the reward for recovering all of the pieces warrants the risk. The 48K program features a number of major advantges over Jet Set Willy. The games' designer, ELITE stresses that each of the games 60 plus screens settings is genuinely high resolution as opposed to psuedo high-res and doesn't require a title to explain what you're looking at. The Sprite characters are of cartoon quality and exhibit their own unique personalities. Impressive claims. Jet Set Willy fans will no doubt feel both sceptical and intrigued. Now they can find out for themselves!

Available September 15th for –

Spectrum 48K . . . . @ £5.95 (Cass)
Commodore 64 . . . . @ £6.95 (Cass)
. . . . @ £8.95 (Disc)

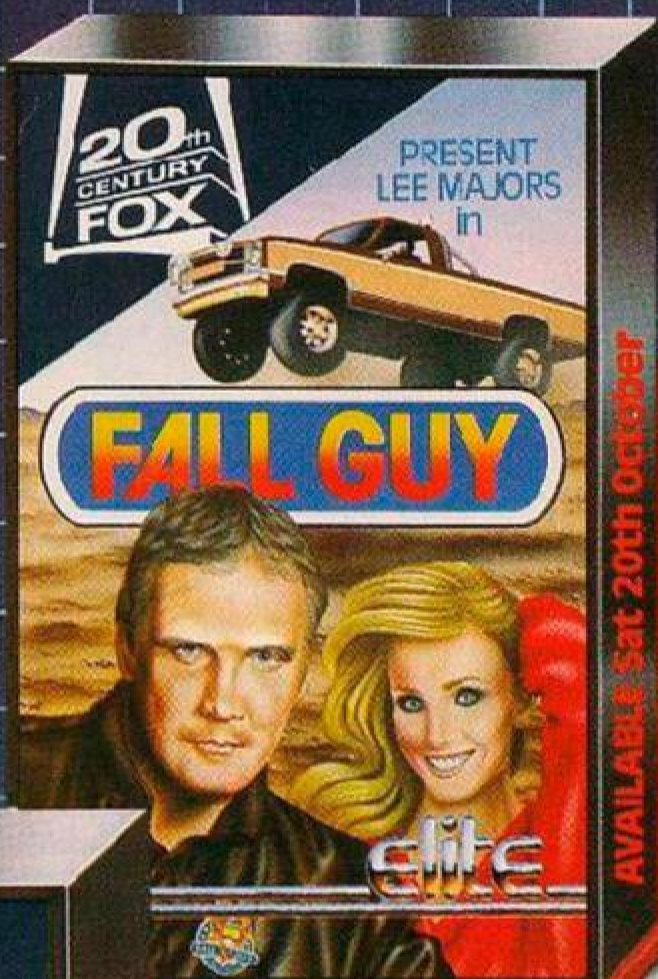
The Fall Guy

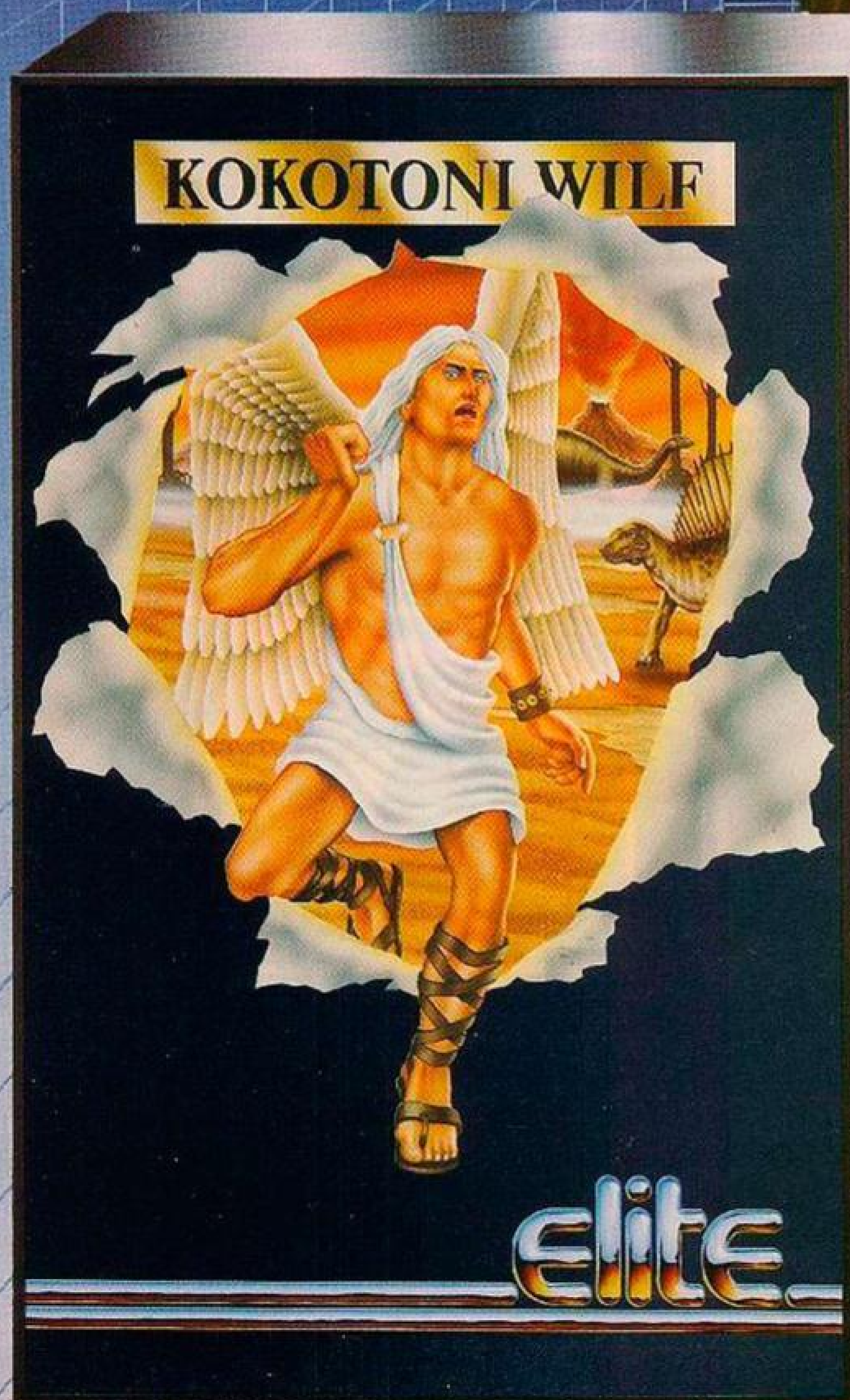
'Colt Seavers is a top Hollywood stuntman who uses the extraordinary skills he displays before the camera when moonlighting as a modern Bounty Hunter, who apprehends and brings in Bail Bond jumpers. Colt is ably assisted by his would-be manager Howie, his beautiful stunt girl protege, Jody, and Terri the lady from the Bail Bond Company, who hires Colt when he's not before the cameras.

The cast of characters is

Colt Savers . . . . LEE MAJORS
Jody Banks . . . . HEATHER THOMAS
Howie Munson . . . . DOUG BARR
Terri Micheas . . . . MARKIE POST

Available October 20th





Every single 'ELITE' product carries the unique 'ELITE' Holographic Sticker. Make sure your copy does, its your guarantee of quality.

48K Spectrum and Commodore 64

Mail Order: Just send a cheque or P.O. payable to 'ELITE' or quote your credit card no.

Elite Systems Ltd., 55 Bradford Street, Walsall, England WS1 3QD. Telephone (0922) 611215. Telex 335622 SPETEL G Attention: Elite

Peripheral perfection



No more fumbling with the game control keys, now you can have joystick control on the ZX Spectrum. The Kempston joystick interface allows all joysticks in the Kempston range (and others that are Atari compatible) to be used with the Spectrum. Simply plugs into the edge connector. No modifications necessary. **ONLY £11.50**



Compatible with ZX Interface 1 the Pro-Interface has three 9-way D Sockets. Two of the sockets allow compatibility with Sinclair/Psion software whilst the third offers the dual facility of both Kempston joystick software and cursor key software. The Pro-Interface also features a cartridge slot for ROM based software. **ONLY £19.95**



Maximum arcade quality features at a reasonable price. Features: □ Top fire button for one handed thumb control □ Trigger button for one handed index finger control □ Base fire bar for left or right handed control □ 8-way arcade quality leaf switches □ Rubber return action □ 1.5 metre cable. Commodore and Atari compatible. See joystick interface for Spectrum compatibility. **ONLY £12.75**



At last an RS 232 interface for the ZX Spectrum allowing connection to any printer which follows the RS 232 protocol. The interface has its own EPROM allowing the use of keywords LLIST, LPRINT and COPY. We recommend the Brother EP44 Printer for use with this interface. Interface complete with cable and connector **ONLY £45.00**



The ultimate joystick for the home computer. Features: □ Ergonomic design and nylon covered steel shaft □ 8-way arcade quality leaf switches □ Dual fire buttons for left or right handed play □ Rubber return action for smoothness □ 1.5 metre cable.
Commodore and Atari compatible. See joystick interface for Spectrum compatibility. **ONLY £13.50**



The Kempston centronics interface will allow you to utilise a vast range of printers with an industry standard centronics input port on the ZX Spectrum. **Interface E** has all operating commands held in an EPROM so plug in and its ready to use. **ONLY £49.99** **Interface S** offering similar features as above but software routines are provided separately to initialise the interface before use. **ONLY £35.00**

KEMPSTON
MICRO ELECTRONICS LTD

Full details on all our products are available on request. S.A.E. please. Most products are available from WH Smith, Boots, Spectrum Computer Centres, good computer shops or direct. All prices include VAT and P & F. Please allow 21 days for delivery.

Kempston Micro Electronics Ltd., Singer Way, Woburn Road Industrial Estate, Kempston, Bedford, MK42 7AF
Tel: (0234) 856633 Telex: 826078 KEMPMI G



Trade Enquiries Welcome

First, a question.

Who do you think are the world's most avid consumers of microcomputers?

The ingenious Japanese? The fashionable French? The acquisitive Americans?

Believe it or not, it's we British who own more micros per person than any other nation on earth.

Yet, despite its amazing impact, the microcomputer has only just begun to scratch at the surface of our lives. Without doubt, the best is yet to come.

Use and Abuse.

In several recent surveys, some astonishing facts about micro use and abuse were revealed.

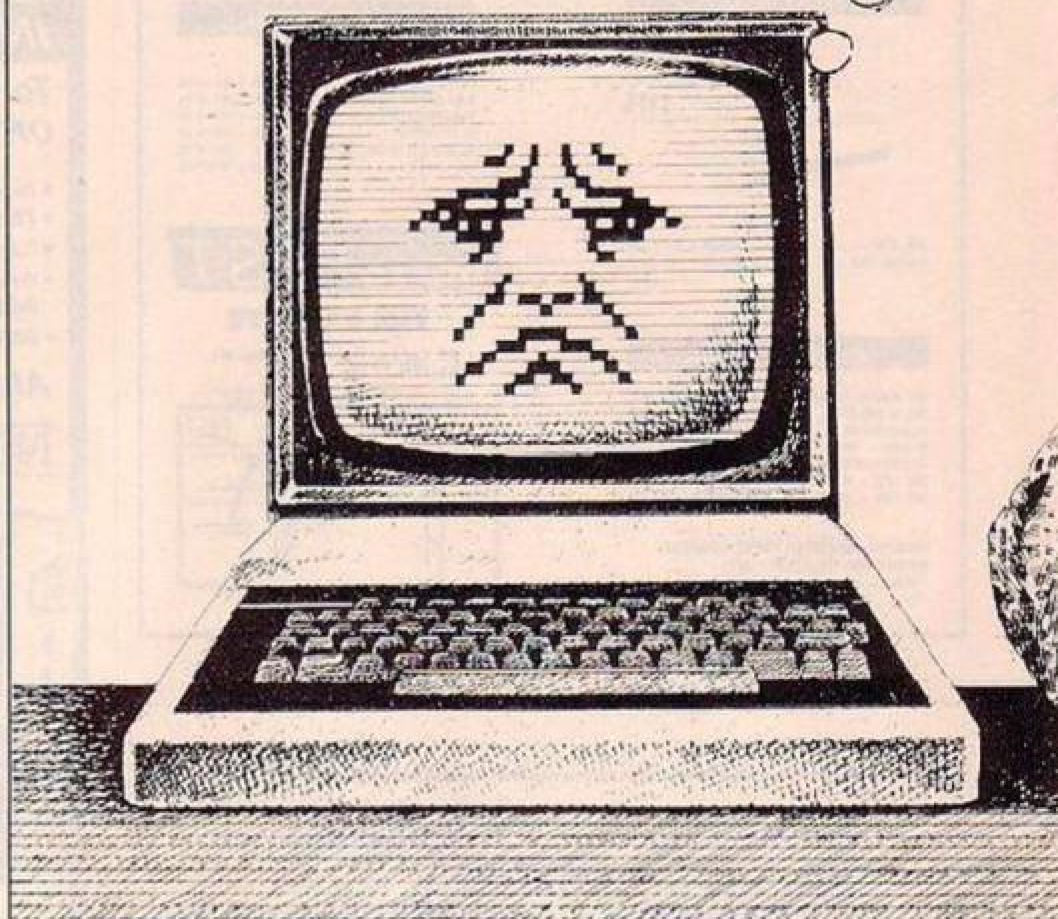
It was discovered that the micro is hopelessly under-utilised. If you're already a micro owner, your own experience may well confirm this unhappy state of affairs.

Brainpower. A source of knowledge.

For thousands of years, the key to self improvement has been in the hands of the written word. Now, thanks to the Brainpower range, it's very much in the hands of the micro.

As the Brainpower range demonstrates, this does not require prior knowledge of micros, or how they work.

The Brainpower concept has been devised as *integrated* applications and educational software. And its aim



Now you and y
bring out the be

is to stretch both your mind and your imagination.

It offers a unique way to realise your own full potential and that of your micro. In a way you could never hope to achieve from the printed word alone.

In this respect, the Brainpower range stands on its own.

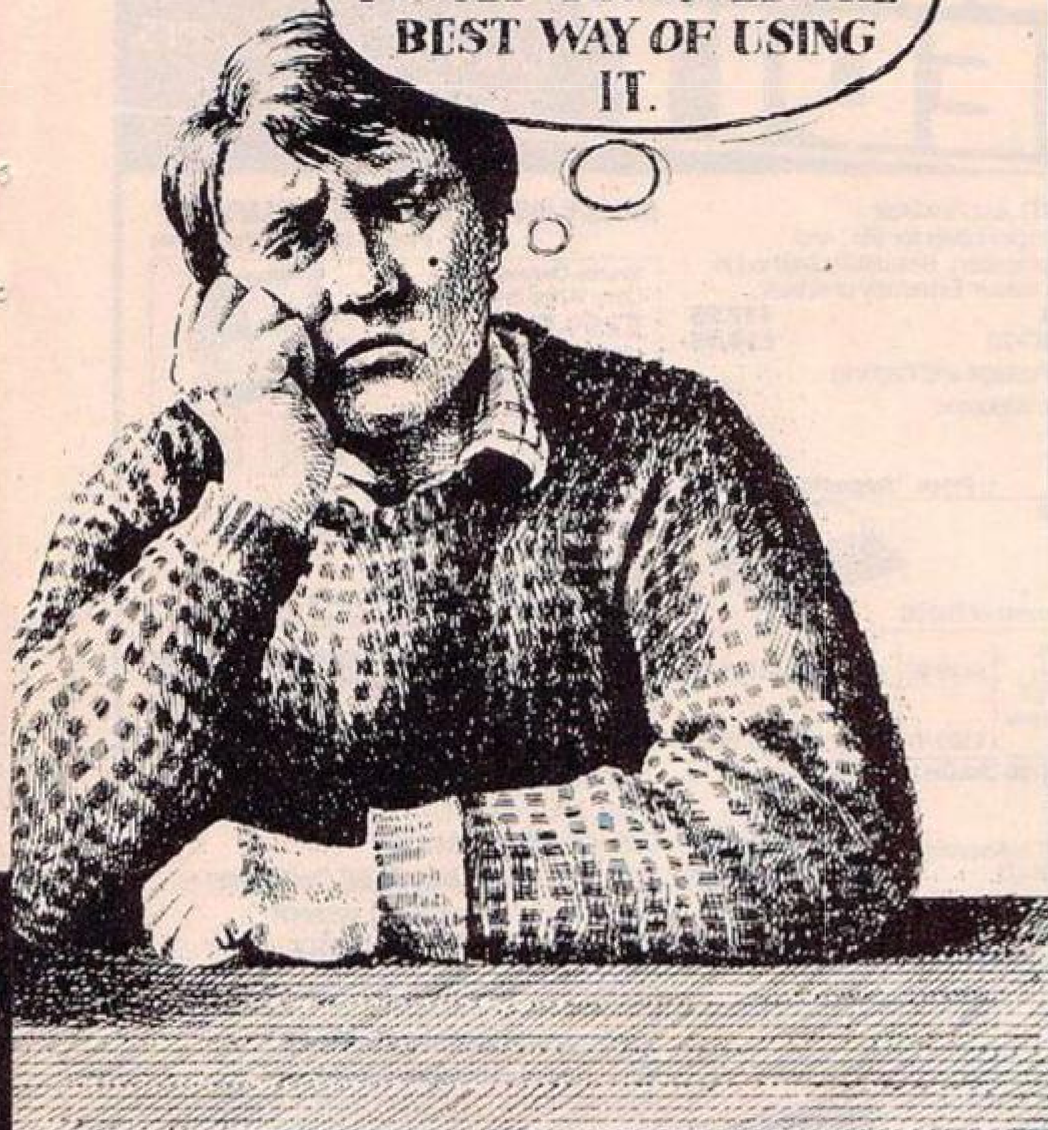
A unique concept.

All the Brainpower titles share one thing in common, apart from their stimulating subject matter, that makes them unique.

You will find each title comprises three distinctive elements: A teaching program that helps you to get to grips



Each Brainpower title provides a unique three part package: an applications program, a teaching program and an illustrated manual and interactive tutorial – integrated applications and educational software.



our micro can
st in each other.

with the subject at your own pace. An applications program to put what you learn into action. And finally, with each package you get an expertly written book and interactive tutorial.

STAR WATCHER

The secrets of the heavens are yours. Isolate all the constellations as well as main stars for easy identification. Even turn stars and constellations on and off at will. Screen by screen, you will see exactly how the 1,500 brightest stars move through time and space. And all from any point on the Earth's surface at any time of the year.

Star Watcher is without doubt the definitive home observatory.

DECISION MAKER



Should you buy a new house? Change jobs? Have children? Start your own business? Such decisions should not be taken lightly. Armed with Decision Maker, you can be quite sure of examining every avenue, and arriving at a rational, structured answer.

If you value the way you run your life you need Decision Maker.

NUMBERS AT WORK

Tackle all the number problems you're likely to face in daily and business life. From straightforward multiplication and division of fractions, through decimals, percentages, ratios, mark-ups and margins to compound interest, depreciation, VAT and PAYE.

Numbers at Work gives you a distinct edge, since you will be able to both understand and manipulate numbers at will.

PROJECT PLANNER

Project Planner teaches you how to divide even the most complex project down into meaningful components. Learn how to determine the length and importance of every single task, and those elements critical to the fulfilment of your plan. Even anticipate problems you hadn't envisaged.

You have the measure of any situation because you have the fullest possible grasp of all the factors which affect it.

FORECASTER

Forecaster takes the guesswork out of forecasting, by accepting that tomorrow's events will be best predicted on the basis of today's facts. Armed with Forecaster sales targets and growth trends, even sporting events and election results can be accurately and very quickly predicted.

Invaluable to you in both your private and business life.

ENTREPRENEUR

Entrepreneur teaches you all the steps required to plan and start your own business. It will forecast your first 18 months' cash flows, generate your Profit and Loss Account and Balance Sheet. Help you in discussions with your bank manager and partners. Explain the notions of assets, liabilities, overheads, working capital, cash flow and break even point.

Invaluable to anyone who is planning a business venture.

	SPECTRUM 48K	BBC B Tape	BBC B DISK 40/80 Track	COMMODORE 64 Tape	COMMODORE 64 Disk
Tick your choice	£14.55	£19.95	£24.95	£19.95	£24.95
Decision Maker		N/A	N/A		
Numbers at Work		N/A	N/A		
Star Watcher		N/A	N/A	N/A	N/A
Entrepreneur		N/A	N/A		
Project Planner	N/A				
Forecaster	N/A				

Please add £1.50 for postage and packing

* I enclose a cheque or postal order crossed and made payable to Triptych Publishing Ltd for £ ______

* Please debit my Access/Barclaycard number ⎣⎣⎣⎣⎣⎣⎣⎣⎣⎣⎣⎣⎣⎣⎣⎣

NAME ______

ADDRESS ______

POSTCODE ______

TELEPHONE ______ SIGNATURE ______

Send to: Triptych Publishing Ltd. (TBL Book Service Ltd) FREEPOST, CAMBERLEY, SURREY GU15 3BR. All goods fully tested and returnable if in any way defective. Allow 28 days for delivery. *Delete as applicable

YC1984

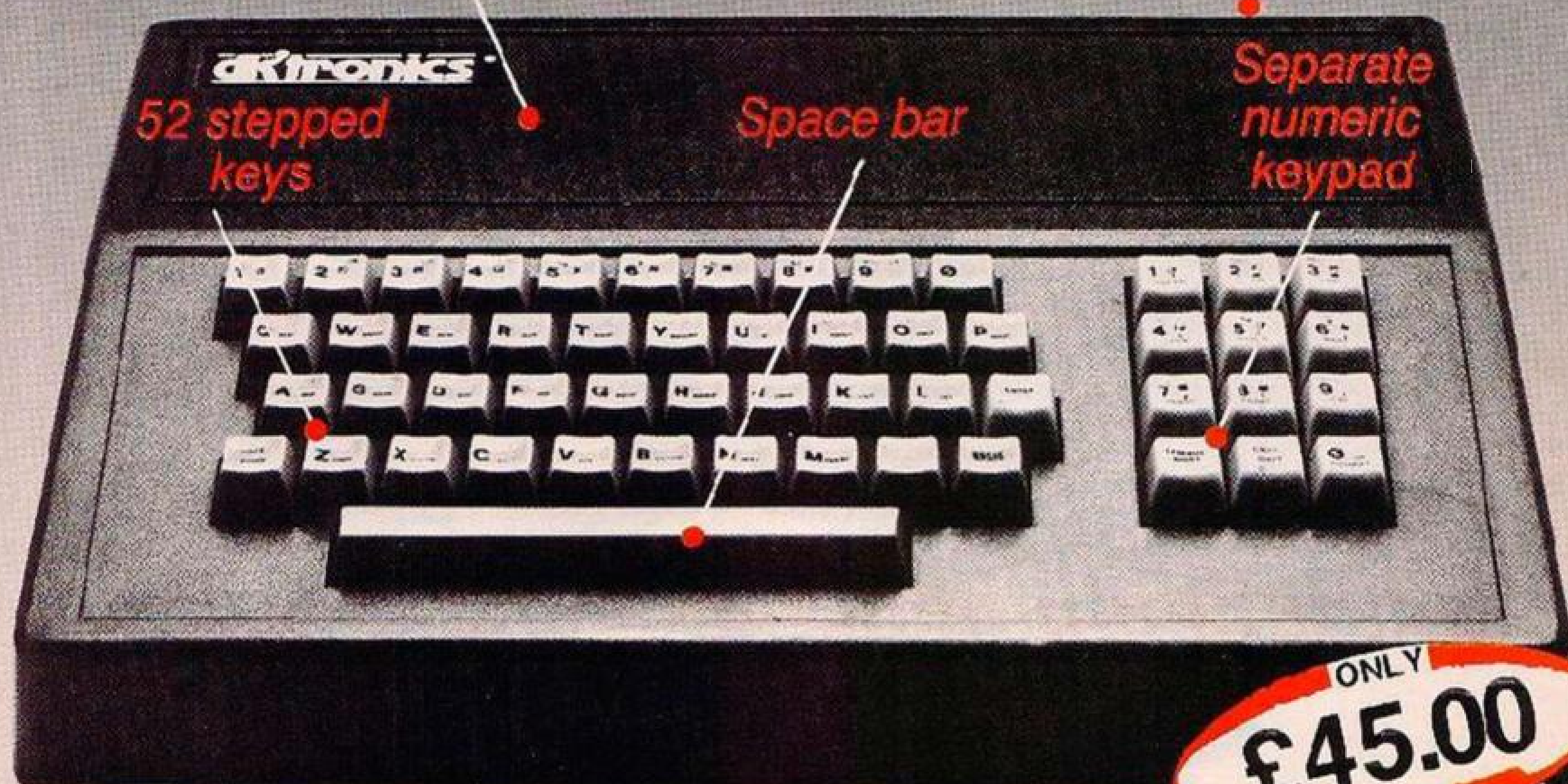
BRAINPOWER

THE FINAL TOUCH

We've just added the final touch to our professional keyboard.
This new Microdrive compatible keyboard offers more key functions than any other in its price range. And the stepped keys and space bar make it even easier to use.
Our keyboard, constructed from high density black ABS, will take your Spectrum into the professional league.
It has 52 "stepped" keys plus space bar. A separate numeric key pad consisting of 12 red keys including a single entry 'delete' plus single entry 'decimal point', facilitate fast numeric data entry.
The 15" x 9" x 3" case will accommodate your Spectrum and other addons like interface 1, power supply etc. and forms an attractive self-contained unit.
All connections, power, Mic, Ear, T.V., network RS232 and expansion port are accessible at the rear.
A few minutes, a screwdriver and the simple instructions supplied are all you need to fit your Spectrum.
All dktronics products are covered by a *comprehensive guarantee.*

Constructed from high density block ABS

All connections accessible at rear



ONLY £45.00

No Price Increases!

Please rush me the following
.... Microdrive compatible
keyboard(s) £45.00
Please add post and packing £1.25
I enclose cheque/PO/Cash for Total £ ________
or debit my Access/Barclaycard No.
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signature ________ Name ________

Address
Or send S.A.E. direct for the new D.K.Tronics Spectrum Catalogue

CC9-84

And it's Available NOW!

"Available direct or from good computer shops anywhere"

dk'tronics

DK Tronics Ltd., Unit 6, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ. Telephone: (0799) 26350 (24 hrs) 5 lines

The Spectrum Connection

NOT JUST A PRETTY ~~Inter~~ FACE!

Our new generation light pen and interface is designed specifically for your Spectrum and works down to pixel level for complete accuracy. Now you can produce high resolution illustrations with the 16 pre-defined instructions, selected from the screen controlled menu. Change colour, border, paper, ink. Draw circles, arcs, boxes or lines. You can fill in objects with colour, insert text or draw freehand, save and load completed or partially completed screens onto and from a tape and with a 48K Spectrum retain screens in memory and animate. You can also use the machine codes in your own programmes for selecting from a menu, playing games etc. (all entry points supplied). The interface fits neatly into position and comes complete with software cassette.



It's Available NOW!

Please rush me the following

.... Light Pen and ....
Interface(s) @ £19.95 each .... £____

Please add post and packing........... £1.25
I enclose cheque/PO/Cash for ...... Total £____
or debit my Access/Barclaycard No.

□□□□□□□□□□□□□□□□

Signature ______________ Name ______________

Address ______________

Or send S.A.E. for the New D.K Tronics Spectrum Catalogue   CC 9-84

"Available direct or from good computer shops anywhere"

dk'tronics

DK Tronics Ltd., Unit 6, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ. Telephone: (0799) 26350 (24 hrs) 5 lines

The Spectrum Connection

NOT JUST A PRETTY ~~FACE~~ *Inter*FACE!

This superb new interface is one of our very latest developments for your Spectrum. Offering even more features, as it's programmable from the keyboard or with the cassette supplied you can now use it with any software. Programmable for up to 17 directional movements i.e. diagonal and fire.

Features include:

- 17 directional movements
- Keyboard remains fully functional
- Works with quick shot to rapid fire actions
- Rear connector for other add-ons
- Microdrive compatible

Quickshot Joystick I © £9.95

- Super positive response
- 2 fire buttons
- Stabilising suction caps
- 4ft lead

Quickshot Joystick II © £12.95

Incorporating all the features of 'Quickshot 1' plus

- Improved control grip
- Trigger fire button
- Rapid fire option



ONLY **£22.95**

It's Available NOW!

NEW!

Please rush me the following

.... Programmable Joystick Interface .... £______

.... Quickshot Joystick I .... £______

..... Quickshot Joystick II .... £______

Please add post and packing £1.25

I enclose cheque/PO/Cash for .... Total £______

or debit my Access/Barclaycard No.

Signature ____________________ Name ____________________

Address ____

Or send S.A.E. for the New D.K.Tronics Spectrum Catalogue

CC 9-84

"Available direct or from good computer shops anywhere"

dk'tronics

DK Tronics Ltd., Unit 6, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ. Telephone: (0799) 26350 (24 hrs) 5 lines

The Spectrum Connection

SOUND IDEAS FOR YOUR SPECTRUM

The Three Channel Sound Synthesiser interface incorporates a BEEP audio amplifier and a 3 channel sound synthesiser.
The BEEP amplifier improves the sound quality and output of the BEEP enormously. The 3 channel sound synthesiser adds a totally new dimension to sound on your Spectrum. It allows you to program your own music with harmonies, explosions, zaps, chimes, whistles and an infinite range of other sounds over a full 8 octaves.

Based around the popular AY-3-8912 sound chip it gives you complete control (from basic or M/C) over 3 channels of tone and/or white noise, plus envelope and volume control. It comes with its own pod mounted (4") speaker with 1 metre of cable so that it can be positioned anywhere.
Once this is fitted to the expansion port your programs will never sound the same again!



ONLY £29.95

NEW!

It's Available NOW!

Please rush me the following

.... Three Channel Sound Synthesiser Interfaces @ £29.95 each. £____

Please add post and packing £1.25

I enclose cheque/PO/Cash for ...... Total £____

or debit my Access/Barclaycard No.

Signature ____ Name ____

Address ____

Or send S.A.E. for the New D.K.Tronics Spectrum Catalogue CC9-84

"Available direct or from good computer shops anywhere"

dk'tronics

DK Tronics Ltd., Unit 6, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ. Telephone: (0799) 26350 (24 hrs) 5 lines

The Spectrum Connection

Home computers.

The report you've been waiting for: simple, factual, honest, comprehensive and 100% biased.

ALL you need to know about computers can be summed up in one word: Commodore. (Well, we did tell you this would be biased).

We make everything you'll ever need to get the most out of home computing: all the *hardware* and all the *software*. (And if you don't understand what that means, simply look under "H").

That's what these three pages are all about: explaining what computers are (without the scientific jargon), how they work (without any technical mumbo-jumbo), and how you can get more enjoyment out of them (without much difficulty).

BASIC. Most home computers speak the same language. It's called BASIC. This is a friendly way of saying "Beginners All-Purpose Symbolic Instruction Code".

There are different kinds of BASIC and, like languages, some are a little easier to understand than others. Like, for instance, BASIC 3.5 in the *Commodore plus/4* and *Commodore 16* computers. BOOKS you can read: "Teach Yourself Computer Programming With The Commodore 64" and "Programmers Reference Guide."

CASSETTE. Just as you keep your favourite TV programmes on video cassette, and your favourite music on audio cassette, you can keep your favourite computer programs on cassette too. You can buy pre-recorded programs in a shop, or you can write them yourself. Cassettes are just one form of program storage and playback – see also *Cartridges* and *Disk Drive*.

The Commodore 1530 and 1531 cassette units have been specifically designed to get the *very* best out of our computers, and provide consistently reliable results.





CARTRIDGES. These are programs that plug directly into the back of the computer itself.

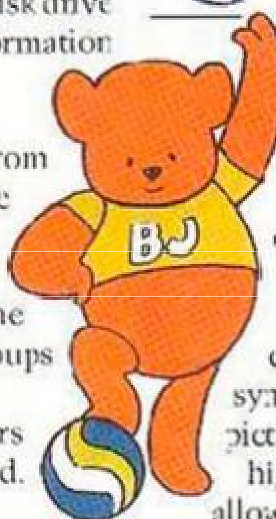
CPU stands for Central Processing Unit. This is the computer's "brain," and basically it's what does all the hard work.

CHIP: micro. A very complex electrical circuit that has been miniaturised in silicon. Unlike other home computer companies, Commodore manufacture their own chips, so first class quality can be maintained.

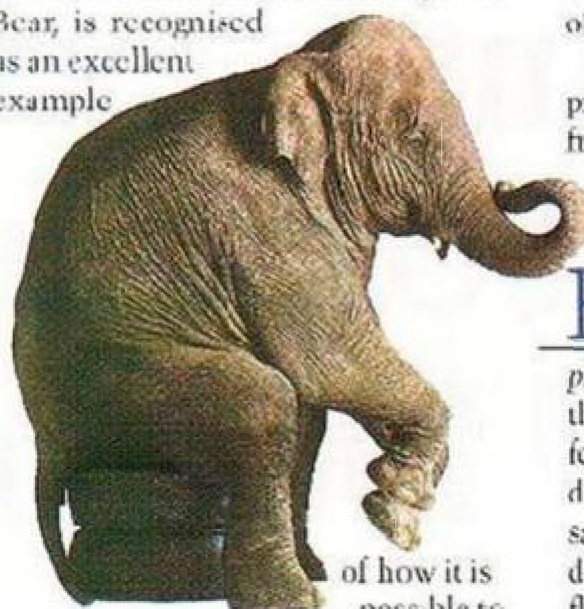
DISK drive. A program storage system, like *cassettes*, but much faster. You can find the program you're looking for in seconds instead of minutes. Disks, which can be used again and again for recording or re-recording programs, are placed in the disk drive which then transfers the information or instructions to the *CPU*.

EDUCATION software from Commodore. We are continually working with educationalists, improving our range of programs for the pre-school to "O" level age groups and beyond.

Many claim computers are an essential educational aid. We tend to agree!

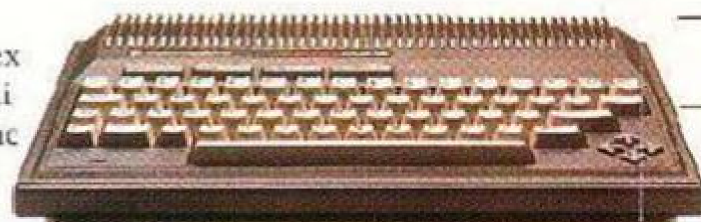


Our "Get Ready to Read" series, with a lovable character called B.J. The Bear, is recognised as an excellent example of how it is possible to develop reading and writing skills in pre-school children.



ELEPHANT: well-known symbol of the *Commodore 64's* enormous 64K memory. And don't you forget it.

FOUR is for Commodore plus/4, our very latest home computer with four, very popular built-in programs: wordprocessing, spread-sheet (financial planning), database (filing), and graphics.



It has an extensive 64K memory, with an exceptionally large 60K available for use. The plus/4 comes equipped with the Commodore BASIC 3.5 with over 75 programming commands.

Other features include comprehensive graphics, 121 colours and sound facilities.

GORTEK and the Microchips is a unique programming course, for children of all ages, that links learning exercises with a space adventure story.

GRAPHICS

The pictures and diagrams on a *monitor* or TV screen, either high or low resolution.

All Commodore home computers have 66 graphic symbols to create low resolution pictures and diagrams, or high resolution modes that allow you to specify each pixel (or dot) on the screen.

(There can be up to 64,000 of these).

GAMES: Commodore produce them all, from shoot 'em up games, to games of adventure and complex strategy.



HELP! On the Commodore *plus/4* computers there is a very special feature: a HELP key. It does exactly what it says: it helps you to debug (which is a flash way of saying, "identify and correct errors") when you're programming.

It highlights errors right down to individual instructions.

HARDWARE.

The computer itself – you can touch it. Whereas software's a program you can only see or hear (on the monitor) when it's running in the computer.

INTEGRAL software is software that's actually built into the computer, as on the Commodore *plus/4*, the very latest in home computing.

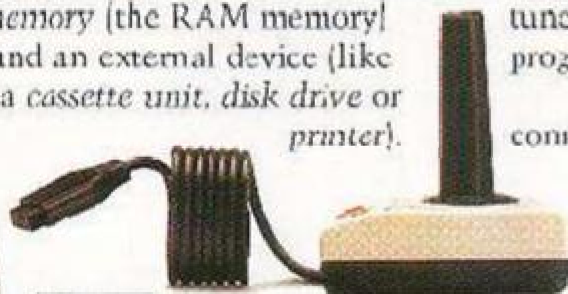
INTRODUCTION to BASIC. Just as you don't need to understand how a car works to be able to drive it, you don't have to understand how a computer works to be able to use one.

But you will definitely get more enjoyment out of it if you do have a basic knowledge of programming.

Which is why "Introduction to BASIC" has become the most popular software tutorial.

It comprises 2 cassettes and an easy-to-follow, step-by-step booklet.

INPUT/output: the part of the computer that allows data to be transferred between its own internal *memory* (the RAM memory) and an external device (like a *cassette unit, disk drive* or *printer*).



JOYSTICK and paddles. As well as improving speed and accuracy, these make games more real by putting the control of whatever it is on the screen directly into your hands.

KILOBYTE is 1,024 bytes. So "K" stands for a unit of 1,024 or 2^{10} A 64K byte memory unit contains 64×2^{10}, or 65,536 bytes of memory. And if you don't understand all that, don't worry.

All that's important is knowing you can run more complex programs through a computer with a large memory, than one with a small memory.

LANGUAGE. This is a system of coding that can be understood by a computer. It allows you to "speak" to the computer, and for the computer to "speak" to you. Most home computers speak *BASIC*, but there are also other languages available for Commodore computers that have been designed for specific uses. For example, LOGO and PILOT in *education*.

MONITOR: this is the screen on which you can see what you've typed into the computer, and also what the computer is saying back to you. You can use an ordinary TV screen, but more preferable is a colour video monitor, like the Commodore 1701.

This is a special device that produces much higher resolution than a TV, and so offers superb reproduction and clarity.

On top of which it allows the rest of the family to stay tuned-in to their favourite TV programme while you're tuned-in to your favourite computer program.

MODEMS allow computers to connect via a telephone line to other computer systems. Commodore 64 modem owners can communicate with other owners, join systems like Prestel/Micronet and an exciting new system called Compunet, where quality software is available cheaply or even free.



MEMORY. There are two basic types of memory: ROM and RAM.

Read Only Memory (ROM) is the computer's permanent built-in memory which tells the computer what to do. It doesn't disappear when the computer's switched off.

Random Access Memory (RAM), however, is for temporary storage. It's the part of the computer's memory that's free for you to use. It can be erased and used over and over again.



It stores data and instructions during the execution of a computer program. These are lost when you switch the machine off – unless, of course you store them on *cassette* or *disk*.

NUMBER ONE. In the whole wide world, Commodore is No. 1 in microcomputers, and the Commodore 64's the No. 1 best seller.



ORIGIN of the computer. In the 19th Century an Englishman, Charles Babbage, invented the first true computer. But his "Analytical Engine," was so ahead of its time, it turned out to be impossible to build!

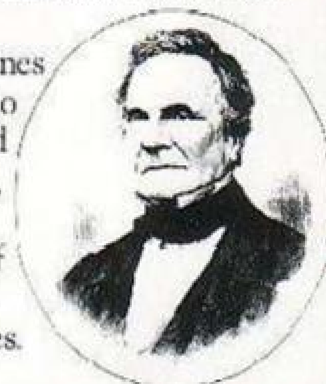
The modern computer first appeared around the time of World War II. Britain's "Colossus" was vast, consumed vast amounts of electricity, required its own air-conditioned room, was unreliable and difficult to operate.

It had its limitations.

Then came the amazing transistor... integrated circuits... and microcomputer.

The first desk top microcomputer in the world was the Commodore PET (a friendly name for Personal Electronic Transactor), in 1977.

In effect Commodore had taken hitherto huge, mysterious machines accessable only to eggheads, reduced the size and price, and put them into the hands of ordinary mortals in ordinary offices.



PERIPHERALS. These are outsid the main body of the computer, but are connected to it.

They perform a definite function, which is usually *input* or output.

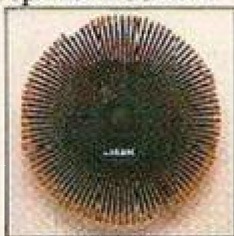
PRINTER: One of the ways a computer can "speak" to us.

It means you can actually keep, on paper, the fruits of all your labour.

The Commodore range includes four printers and one printer plotter.

The MPS 801 dot matrix printer has a print speed of 50 characters per second (about five times as fast as the fastest secretary).

The MPS802 dot matrix friction feed printer has a print speed of 60 characters per second.



The MCS801 dot matrix colour printer has 7 colours and prints 38 characters per second.

The DPS1101 daisy wheel printer (called that because, surprise, surprise, the print wheel looks a bit like a daisy), produces superb quality print on all letters, reports and documents (the kind of quality one desperately requires on a letter to the bank manager). There's a range of alternative type faces available on additional print wheels. Speed: 18 characters per second.

And the 1520 printer plotter, (illustrated). This has 4 colours, and opens up a whole new world of graphic print-out ability. You can draw pictures, create graphic designs, plot graphs or construct bar and pie charts. Speed: 14 characters per second.



QWERTY – the top 6 letters on a typewriter. Unlike lesser machines, all Commodore computers have full-size, professional typewriter keyboards. The Commodore keyboard has a solid, responsive feel to it. (The problem with rubber or membrane keyboards is they have a soft, spongy feel to them: you press a key and immediately wonder if the message has got through).

RANGE. The range of Commodore software is enormous. There is something as they say, for everyone: educational, business, home and games.



STARTER PACK The Commodore 16 Starter Pack has been specially designed to introduce you to computing.

It contains everything you need to start home computing, complete in one box: a 16K computer, cassette unit, four superb software programs, and Introduction to *BASIC* Part 1.

It has a *Help* key in case you get into difficulties, and incorporates Advanced *BASIC*, which has been specifically designed to simplify the programming process.

Other features include: 4 cursor keys, 2 joystick ports, an astonishing 121 colours, plus excellent sound and *graphics* capabilities.

TUNES. Commodore make software to help you compose your very own music.

All our home computers have great sound and music capabilities.

USER friendly. This is a program that explains itself as it goes along, or a computer that people can easily operate.

Every computer manufacturer now claims its products are "user friendly," but only Commodore really demonstrates it. For example, our *Help* key and use of Advanced *BASIC*.

VERTICAL integration is not as complicated as it sounds. All it means is that Commodore make everything to do with computers, from the *micro-chip* to the computer casing.

So we have complete control over everything, from design to distribution.

Also, everything has been specifically designed to get the very best out of your Commodore computer system.

WOMEN also are discovering computers – and not just in offices, but at home. Computers aren't sexist.





They were invented for everyone, and the fact that they're fun, exciting, educational, practical and time-saving are benefits that apply to women just as much as to men.

XMAS. There's no better time to give or receive a Commodore present.



YIPPEE! Yes, now you know (or should do) that computers are really interesting. They're not just about space games with horrendous monsters. Nor are they horrendously complicated machines that you need a maths degree to understand.

Computers are the future, and it's important that you and, even more so, your children don't get left behind in the past.

With a Commodore computer and a *peripheral* or two (and we now know what those are, don't we?) whole new leisure and business opportunities will immediately be opened to you.

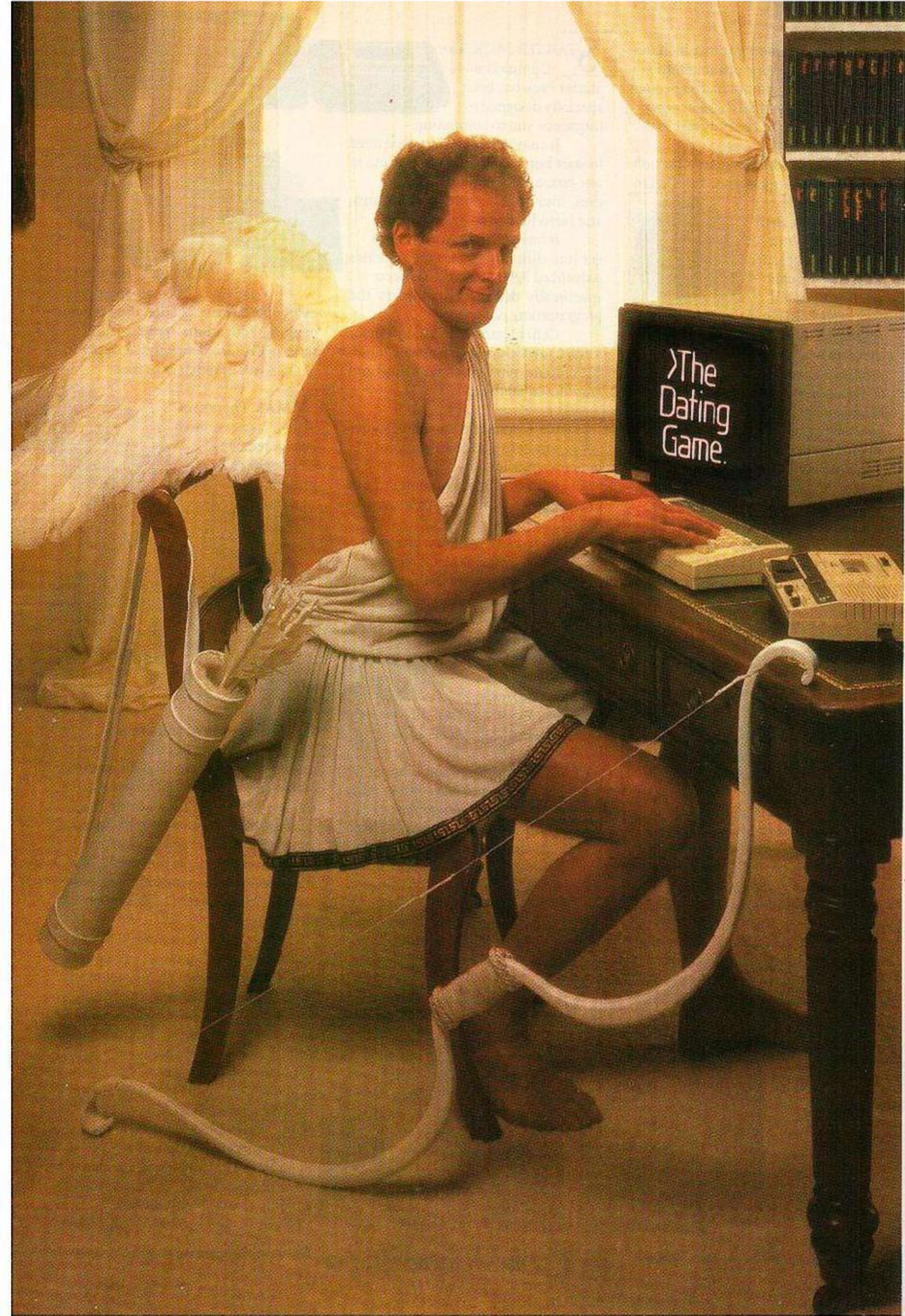
Make the choice now and (just so long as it's Commodore) we promise you will never regret it.

ZIP us a line if you would like to receive more information on any Commodore products.

Write or telephone: Commodore Information Centre, 1 Hunters Road, Weldon, Corby, Northampton NN17 1QX. Tel: Corby (0536) 205252.



commodore


>The
Dating
Game.

Level 9 Adventures are superbly designed and programmed, the contents first rate.

YOUR 64 June 84

Whichever machine you own, if you have the vaguest tendency towards adventure playing then you must try one of these games (unfortunately you'll probably end up wanting to buy the lot!).

Computing Today, August 84

To me, all Level 9 adventures create a remarkable atmosphere because the descriptions sound so life-like. This is where so many other adventures fail.

Crash, July 84

But it's not just the size of the game it's the quality as well that is astonishing ... ... scenes to fire the imagination.

PCG, April 84

As in all Level 9's adventures, the real pleasure comes not from scoring points but in exploring the world in which the game is set and learning about its denizens.

Which Micro?, February 84

ptember 83

I thoroughly recommend these Adventures, they are excellent value for money. No self-respecting Adventure-addict should be without them. I believe Level 9 are producing a series of Adventures which should be regarded as classics.

Atari User, July 84

These programs run very fast and there are no frustrating pauses. Level 9 Adventures are superbly designed and programmed, the contents first rate. The implementation of Colossal Adventure is nothing short of brilliance; rush out and buy it. While you're at it, buy their others too. Simply smashing!

Your 64, June 84

Level 9 – arguably the producer of the best adventure games in the UK – has done it again. LORDS OF TIME is a sparkling addition to its stable of winners.

Acorn User, July 84

(SNOWBALL). This is another imaginative, massive-scaled immensely enjoyable adventure from those experts down at Level 9 Computing.

Your Computer, March 84



Adventure Quest is the second in Level 9's acclaimed Middle Earth trilogy, though it can be played by itself.

Available from W H Smith and good computer shops everywhere. If your local dealer doesn't stock Level 9 adventures yet, get him to contact us or: Centresoft, Microdealer UK, Ferranti & Craig, Leisuresoft, Lime Tree, LVL, PCS, R & R or Wonderbridge.

Level 9 specialise in huge adventure games, cramming over 200 locations and a host of puzzles into your micro. We take care when designing games—writing them like stories with detailed settings and sensible reasons for the puzzles. They are solved by inspiration— not luck.



1. COLOSSAL ADVENTURE The classic mainframe game "Adventure", with all the original puzzles plus 70 extra rooms. □

2. ADVENTURE QUEST An epic puzzle journey through Middle Earth. □

3. DUNGEON ADVENTURE Over 100 puzzles to solve and 40 treasures to find. □

4. SNOWBALL Save the interstar freezer, Snowball 9, in a huge space adventure with over 7000 locations. □

5. LORDS OF TIME An imaginative romp through World History. □

I ENCLOSE A CHEQUE/PO FOR £9.90 EACH

My name: ....

My address ....

....

....

My micro is a: ....

(one of those listed below, with at least 32K of memory).

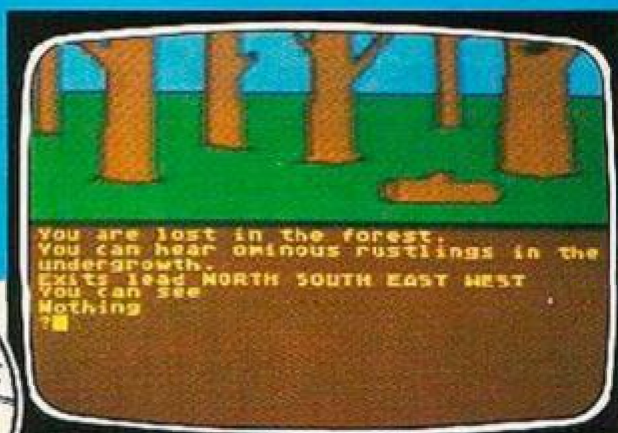
Contact:

LEVEL 9 COMPUTING

Dept. , 229, Hughenden Road, High Wycombe, Bucks. HP13 5PG.

MEMOTECH BBC CBM 64 SPECTRUM ORIC 1 LYNX NASCOM ATARI

'Stranded' by English Software. The challenge that's light years ahead.



Special Agent Sid's First Graphic Adventure

COMMODORE 64
ATARI 400/800 600XL/800XL 32K

Imagine you're Special Agent Sid of the SAS. The year is 2510 AD and you're marooned on a strange planet.

Getting home is the challenge to you from English Software! And 'STRANDED' is the name of the game.

It's Sid's aim to find his starship and return home safely. But not before he's encountered and defeated all the hazards of this lonely, unfriendly planet. And with over 35 graphic screens, that's quite a tall order.

It could be a long mission – but we know you'll want to test your skills against everything that 'STRANDED' can throw at you.

Written in machine code game progress can be saved to cassette or disk.

To make things even simpler, send us the completed coupon below together with your cheque or postal order OR use our

Telephone Sales Hot Line

061-835 1356

(for immediate Access/Visa service).











COMMODORE 64
Cassette (Speedload) £7.95

ATARI 32K Cassette or Disk £9.95

'STRANDED' written by C. Hughes and D. Woodhouse.

All English Software Programs are sold according to the English Software Terms of Trading, copies of which are available on request



Find us at Boots, Laskys, Greens and all good software dealers.



THE POWER OF EXCITEMENT

The English Software Company Box 43, Manchester M60 3AD Trade Enquiries Tel: 061-835 1358.

To: The English Software Company, Box 43, Manchester. M60 3AD.
Please rush me cassette/disk* of 'STRANDED' for Commodore 64/Atari.*

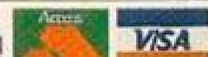
I enclose cheque/PO* for £________(post-free) or debit my Access/Visa Card No________ *Delete as applicable.

NAME ________

ADDRESS ________

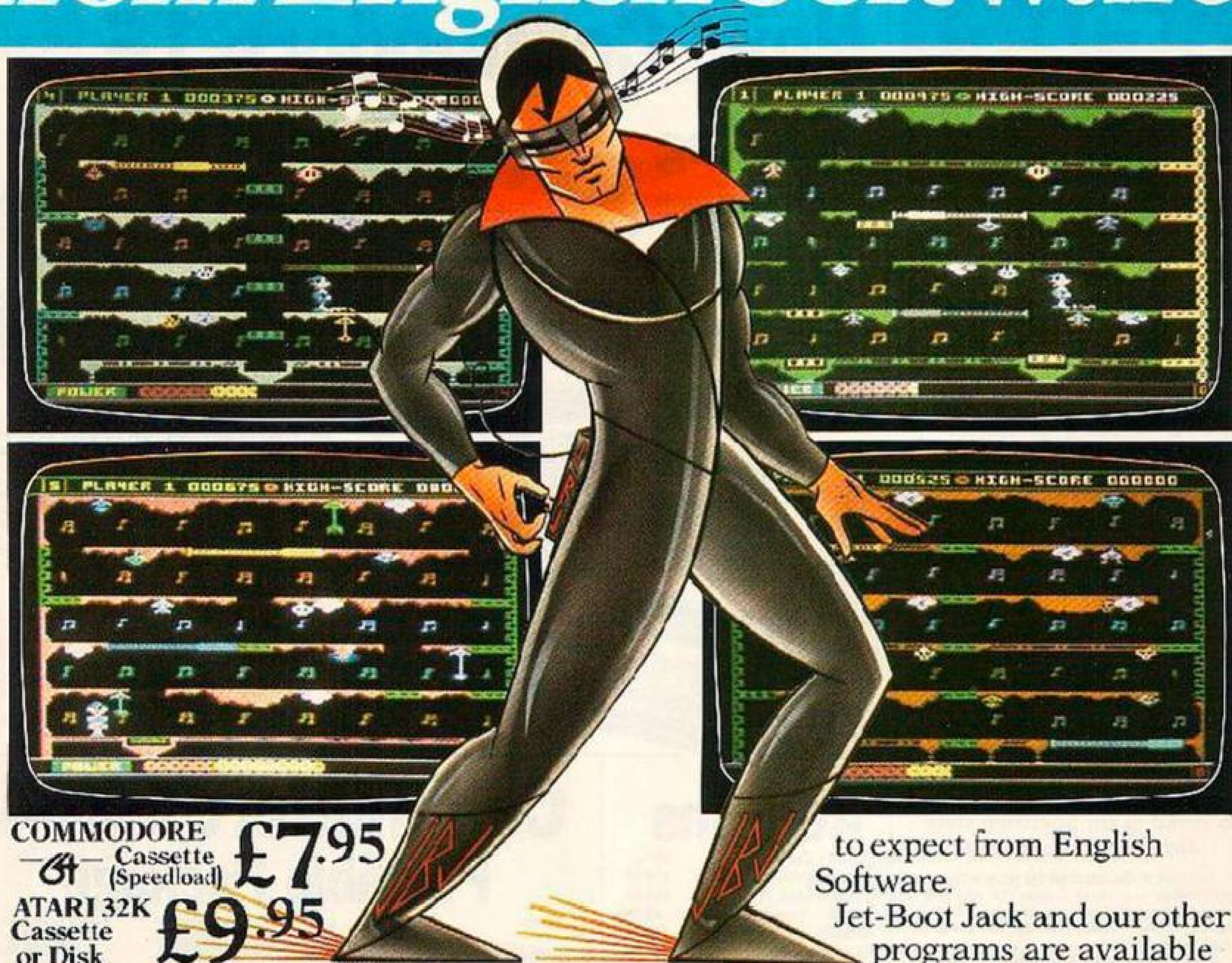
____

YC/S/10/84



Tune-in to Jet-Boot Jack. The massive hit from English Software.

NOW AVAILABLE FOR COMMODORE 64



COMMODORE 64 Cassette (Speedload) £7.95

ATARI 32K Cassette or Disk £9.95

Jet-Boot Jack is fast heading for No 1 spot in the Atari games charts.

Because he's absolutely unique.

Jet-Boot Jack is the space-age jet-powered jogger who takes you on a chase through the vaults of the Record Pressing plant, collecting his favourite music as he goes.

Evil creatures try to thwart his every move, but Jack's special bouncing powers send them hurtling to their deaths!

Sliders and elevators provide access to new levels – but sometimes they turn nasty!

With 10 different screens and 6 skill levels Jet-Boot Jack will stretch your abilities to the limit.

Which, after all, is what you've come to expect from English Software.

Jet-Boot Jack and our other programs are available from branches of Laskys, Greens and all good software dealers.

Telephone Sales Hot Line
(Access and Visa) **061-835 1356**

JET-BOOT JACK

Program written by Jon Williams and Mark Taylor.

ENGLISH SOFTWARE

THE POWER OF EXCITEMENT

The English Software Company, Box 43, Manchester M60 3AD Trade Enquiries Tel: 061-835 1358

(all English Software programs are sold according to the English Software Terms of Trading, copies of which are available on request).

See the super new Commodore Range at your local Spectrum Dealer - Now!



Just Arriving New!

Commodore Plus/4

Commodore's new, advanced Plus/4 bridges the gap between home and business micros in a way that's unique – and at a price that's unbelievable!

The Plus/4 features, besides its powerful 64K of RAM memory, has a host of features to make computing easier.

For starters, there are four popular software packages built-in – Word Processing, Spreadsheet, Database and a Business Graphics program. That's all a small businesses needs – in a budget-priced micro!

Besides that, there's a HELP key that highlights errors in program lines, plus built-in graphics, advanced BASIC 3.5 with over 75 commands, separate cursor controls, a full 32K ROM and 4 programmable function keys.

SPECTRUM PRICE

£299.99

Commodore MPS802 Printer

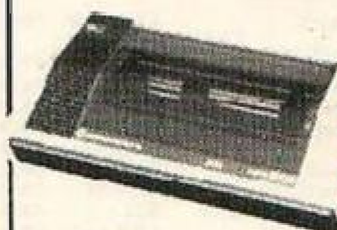
SPECTRUM PRICE

£345.00



MPS801 Printer

SPECTRUM PRICE

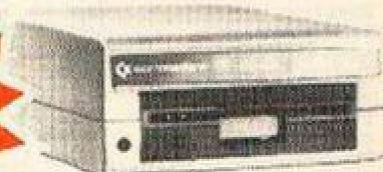


£230

1542 Disk Drive

SPECTRUM PRICE

£229



1530 Data Recorder

SPECTRUM PRICE



£44.95

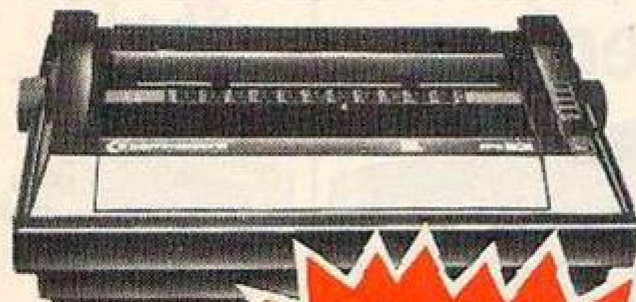
1531 Data Recorder

SPECTRUM PRICE

£44.95



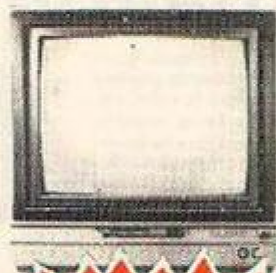
New! DPS1101 Printer



SPECTRUM PRICE

£399.99

Commodore 1701 Monitor



£230

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd

Computer Dealers

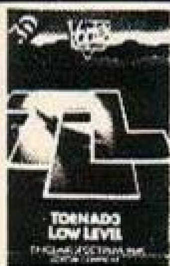
For prospective dealers. If you would like to know more about becoming a SPECTRUM APPOINTED DEALER on an exclusive area basis please write to: Bob Cleaver, Spectrum Group PLC, Hunting Gate, Hitchin, Herts SG4 0TJ Tel (0462) 37171

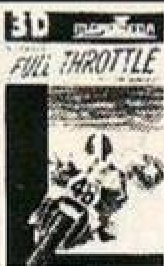
More from Spectrum...

spectrum

Micro Dealer UK's TOP 50

Britains No.1 Weekly Software Chart







PROGRAM	SUPPLIER	MACHINE	PRICE
Daley Thompson's Decathlon	Ocean	CBM 64	£7.90
Full Throttle	Micromega	Spectrum	£6.95
Jet Set Willy	Software Projects	Spectrum	£5.95
Sabre Wolf	Ult mate	Spectrum	£9.95
Olympicon	Mitec	Spectrum	£5.95
Astro Chase	Statesoft	CBM 64	£8.95
Flip & Flop	Statesoft	CBM 64	£8.95
Frak!	Aardvark	BBC	£8.95
Decathlon	Activision	CBM 64	£9.99
Beachead	Access	CBM 64	£9.95
Matchpoint	Psion	Spectrum	£7.95
Evil Dead	Palace S/W	CBM 64	£6.90
Potty Pigeon	Gremlin Graphics	CBM 64	£7.95
Tales of the Arabiar Knights	Interceptor	CBM 64	£7.00
Mr Wiz	Superior	BBC	£7.95
Zalaga	Aardvark	BBC	£8.95
Football Manager	Addictive	CBM 64	£7.95
Lords of Midnight	Beyond	Spectrum	£9.95
Tornado Low Level	Vortex	Spectrum	£5.95
Star Trader	Bug-Byte	Spectrum	£6.95
Hero	Activision	CBM 64	£9.99
Monty Mole	Gremlin Graphics	Spectrum	£6.95
Deathstar Interceptor	System 3	CBM 64	£9.95
Stop the Express	Psion	Spectrum	£5.95
Worse things happen at Sea	Silversoft	Spectrum	£5.95
Monty Mole	Gremlin Graphics	CBM 64	£7.95
Giants Revenge	Thor	Spectrum	£6.95
World Cup	Artic	Spectrum	£6.95
Pitfall	Activision	CBM 64	£9.99
Star Striker	Superior	BBC	£7.95
Beamrider	Activision	CBM 64	£7.95
Psytron	Beyond	Spectrum	£7.95
Rascallion	Bug-Byte	Spectrum	£6.95
Strip Poker	Artworx	CBM 64	£9.99
Gisburnes Castle	Martech	BBC	£7.95
Atic Atac	Ultimate	Spectrum	£5.50
Mission 1	R & B Software	Spectrum	£7.95
Factory Breakout	Poppysoft	Spectrum	£7.95
Automania	Mikrogen	Spectrum	£7.95
Trashman	Quicksilva	CBM 64	£7.95
Chequered Flag	Psion	Spectrum	£6.95
Mission 1	R & B Software	CBM 64	£8.95
Encounter	Novagen	CBM 64	£9.95
Valhalla 64	Legend	CBM 64	£14.95
Android 11	Ocean	CBM 64	£6.90
Titanic	R & R Software	Spectrum	£6.95
Jack & the Beanstalk	Thor	Spectrum	£5.95
The Count	Adventure International	BBC	£7.95
The Hulk	Adventure International	CBM 64	£9.95
Dare Devil Dennis	Visions	CBM 64	£7.95

Amstrad Software all at £8.95

EDUCATIONAL SOFTWARE	Time Man 2	Roland on the Ropes	3-D Invaders
Wordhang	Map Rally	Electron 22622	Alien break-in
Happy Numbers	ARCADE GAMES	Gems of Stradus	Atom smasher
World Wise	Home Runner	Chess	Electro Freddy
Animal, Vegetable, Mineral	Harrier Attack	Laser Wrap	Fire Blaster
Happy Letters	Sultans Maze	Haunted Hedges	Admiral Graf Spee
Happy Writing	Spanner Man	Codename Matt	Star Commands
Time Man 1	Oh Mummy	Xanagrams	Crazy Golf
	Roland in Care	Hunter Killer	Punchy

BBC Model B
Package Offer



HURRY! Offer extended WHILE STOCKS LAST

Including FREE!

• Cassette recorder • 5 pieces of software

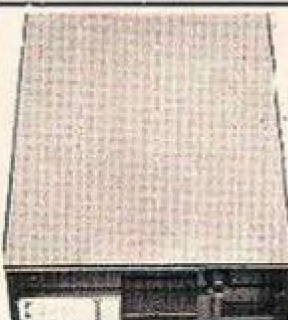
when you purchase a BBC 'B' from Spectrum.

The BBC MODEL B, probably the most flexible personal microcomputer available today. Using powerful BBC BASIC, the BBC B is widely accepted as providing the educational standard for computer learning.

The model B features a variety of interface ports allowing easy connection not just of ordinary peripherals but also second processors or devices to give access to teletext or prestel services.

£399

Cumana Disc Drives



CSX 100	CS100
£129.95	£159.99

Acorn Electron

The Electron gives high quality graphics output to either colour TV or monitor. Sound can be generated through the internal loudspeaker. The Electron comes complete with a free introductory cassette, containing 19 free programmes & two manuals - the User Guide and Start programming with the Electron."



SPECTRUM PRICE **£199.95**

Shado Data Recorder



Compatible with Acorn/BBC & Electron Micros

SPECTRUM PRICE **£32.95**

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE



Up to £1000 Instant Credit

• There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR -29.8%

Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

The New Sinclair QL

ARRIVING SOON!



32-bit power . . . 128K RAM . . . business software . . . it's the amazing QL!

The QL is a ready-to-go small business /office system, with a 32-bit 68008 microprocessor for rapid data processing and a huge 128K of RAM memory - twice as much as any other micro at the price, and expandable to 640K. Then there's the 2 built-in Microdrives, a full keyboard and 3 'bundled' business programs - Archive (database), Abacus (spreadsheet) and 'Easel' (business graphics). With the 'Quill' program, it becomes a wordprocessor. Its Basic is superior to Spectrum Basic; graphics resolution is high at 512 x 256 with a multiple screen window facility and there's multi-tasking capability. In short, a superb machine - at an incredible price!

SPECTRUM PRICE

£399

Sensational Sinclair Offer

ZX Spectrum 48K



Including

FREE!

Software 6 pack

Containing: • Computer Scrabble • Computer Chess • Survival game • Chequered Flag game • Horace goes Skiing game • Make-a-Chip

Worth £56.70

SPECTRUM PRICE

£129.95

ARRIVING SOON!

Sinclair Flat-Screen TV



SPECTRUM PRICE

£99.95

Here it is - the incredible new TV that's a revolution in technology . . . available from Spectrum NOW! The amazing Flat-Screen TV has a picture that's 3 times brighter AND half the bulk of an ordinary screen of the same size - yet it uses between 1/4 and 1/10 the power! The new front-coated phosphor screen gives a pin-sharp image despite its pocketable size. The set uses just one tiny Lithium battery for long life and comes with a pouch case and earphone.

Prism VTX5000 Modem



£79.95

- Versatile modem for ZX Spectrum (16K or 48K) versions
- Slim design fits easily, matches your micro
- Instant access to Prestel™ & Micronet 800 information services
- Instant communication with other ZX Spectrum users.

DK'Tronics Keyboard

D'Ktronics Lightpen £19.95
D'Ktronics Dualport Joystick Interface £13.00
D'Ktronics Programmable Joystick Interface £22.95

SPECTRUM PRICE

£45

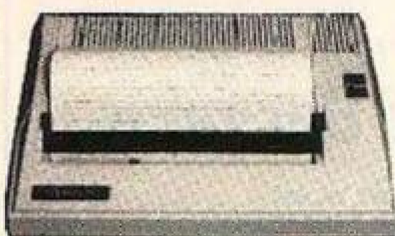


Plus! FREE 4 GAMES CASSETTE

Alphacom 32 Printer

SPECTRUM PRICE

£79.95



ALPHACOM 42 For Dragon, BBC, Commodore, Atari (Interfaces extra) SPECTRUM PRICE £79.95

Paper Rolls for Alphacom Printers Box of 5 Rolls £6.00

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum computer manufactured by Sinclair Research Ltd.

Computer Dealers

or prospective dealers. If you would like to know more about becoming a SPECTRUM APPOINTED DEALER on an exclusive area basis please write to: Bob Cleaver, Spectrum Group PLC, Fishponds Gate, Hitchin, Herts SG4 0TJ Tel: (0462) 37171

More from Spectrum . . .

spectrum

Juki 6100

Super Value! **Daisy Wheel Printer**



This fabulous new printer is a real break-through in the performance/value stakes! For a remarkably low price you get all these great features:
• Daisywheel printing • 20cps (av. 18cps Shannon Text) • 10/12/15 or Proportional character spacing • Bi-directional friction-feed • Tractor feed or cut paper • Centronics as standard; RS232C optional • 2K byte print buffer

£399

Sensational Printer Offers from Spectrum

Quendata

Just look at this for value - a true daisy-wheel printer offering top quality printing at a remarkably low price. Print speed is 18/20cps, uni-or bi-directional printing (depends on software), variable pitch.



SPECTRUM PRICE £289.95

Tractorfeed optional extra

Other Printer Bargains

SEIKOSHA		CP100VC VIC 20/64	£199.95
GP50A	£99.95	Friction Feed GP100/250X	£28.75
GP50S Spectrum	£99.95	EPSON	
GP500A	£179.95	FX80	£503.70
GP550A	£229.00	RX80T	£286.35
GP100A MkII	£199.95	RX80FT	£327.75

Brother HR-5



Super value printer that prints on plain paper, yet still fits in your briefcase.
• Operates on 4 standard batteries
• Incorporates Centronics or RS232C
• Bidirectional or unidirectional
• High quality Thermal head
• Prints at 30cps on plain paper (with ribbon) or directly onto thermal paper
• Weighs under 2kg

SPECTRUM PRICE £159.95

Brother HR-15



A great printer at a top-value price from Spectrum. Here's what you get:
• Letter-quality daisy-wheel printing
• Between 13 and 18cps
• Bi-directional printing
• Tractor-fed paper or single sheets
• Super low price!

SPECTRUM PRICE £458.85

Brother EP-44



"Transforming Office Machines", runs Brother's slogan - with these super-compact battery powered typewriters, it's easy to see why!
• Top quality thermal printing head
• 4K of text memory (2 A4 pages)
• Text centring if required
• 15-digit LCD display for pre-printing corrections
• Line-by-line edit facility

SPECTRUM PRICE £249.95

Smith-Corona D100



This superb dot matrix printer from Smith-Corona is a sleek, well-made machine that'll work with either tractor- or friction-fed paper. It offers a fast 120cps print speed, with 80 characters per line and a choice of well-defined typestyles. The D-100 incorporates a Centronics parallel interface.

Also available
Fastex 80
£225.17

SPECTRUM PRICE £286.35

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE



Up to £1000 Instant Credit

• There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR 29.8%

Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

Atari

A great line up from one of the first names in home computing... ...Now at Super New Low prices from Spectrum

Atari 800XL



• Powerful 64K RAM • Full-stroke keyboard • Full sound with 3½ octave range • 11 Graphic Display modes • Full colour (256 Colours - 128 colours can be diplayed at one time) Ask to see this supernew micro at your local SPECTRUM dealer NOW!

SPECTRUM PRICE £199.99

Atari 850 Interface



Essential for more advanced work with their Atari computers. It provides 1 parallel output for a huge range of printers, and no less than 4 serial outputs which can be individually programmed for different purposes. It comes with a comprehensive manual, power pack & interconnecting cable to the computer.

SPECTRUM PRICE £99.99

Atari 1027
Letter Quality Printer



This superb Letter Quality Printer prints fully-formed letters just like a quality electric typewriter, making it the ideal word-processing companion for business correspondence. The Atari 1027 accepts single sheets of paper so you can even use your own letterhead paper.

SPECTRUM PRICE £249.99

Atari 600XL

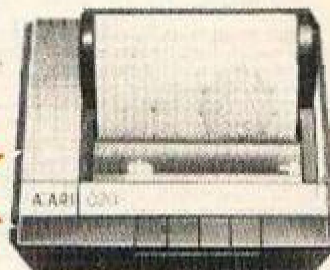


The 600XL features a 16K RAM, expandable to 64K with the memory expansion module. There's a 24K ROM operating system including ATARI BASIC. Plus 16 colours, 11 graphic modes and 4 independent 3½-octave sound synthesisers. It really is a top-value micro – come in and see for yourself!

SPECTRUM PRICE £99.99

Atari 1020 Printer/Plotter

Using 4 colour graphics and text, the 1020 colour printer/plotter is perfect for creating charts, graphs & even artistic designs. Very quiet operation.



SPECTRUM PRICE £99.99

Atari 1010
Program Recorder



Add storage and retrieval capability to your Computer system without spending a lot of money. Uses cassettes to store text, programs & other information.

SPECTRUM PRICE £34.99

Atari 1050
Disk Drive



Add the Atari 1050 Disk Drive for fast, convenient data access by storing on compact, easy-to-handle 5¼" disks. Storage capacity with DOS 11 up to 127K bytes, (around 100 pages) of information per disk.

SPECTRUM PRICE £199.99

Atari Software

Intertainment
Asteroids £9.99
Basketball £9.99
Caverns of Mars ... £9.99
Centipede £9.99
Chess £9.99
Galaxian £9.99
Jungle Hunt £9.99
Pac Man £9.99
Lone Raider £9.99
Missile Command £9.99
Pengo £9.99
Qix £9.99
Space Invaders ... £9.99
Star Raiders £9.99
Super Breakout ... £9.99
Tennis £9.99
Defender £14.99
Dig Dug £14.99
Donkey Kong ... £14.99
Donkey Kong JR . £14.99
Joust £14.99
Ms pac Man ... £14.99
Pole Position ... £14.99
Robotron £14.99
Logo & Manuals . £59.99
Video Easel £22.99
Music Composer £22.99
Assembler Editor £22.99
Invitation to Prog 1 (Cassette) £19.99
Invitation to Prog 2 (Cassette) £22.99
Invitation to Prog 3 (Cassette) £24.99
Juggles Rainbow (Disk or Cassette) £19.99
Juggles House (Disk or Cassette) £19.99
Touch Typing £12.99
Conversational French (Cassette) £22.99
Conversational German (Cassette) £22.99
Conversational Spanish (Cassette) £22.99
Conversational Italian (Cassette) £22.99
Macro Assembler (Disk) £19.99
Micro Soft Basic & Manuals (Disc) . £49.99
Mickey & the Great Outdoors (Disk) £24.99
My First Alphabet (Disk) £19.99
Paint (Disk) £29.99
Microsoft Basic II & Manuals £49.99
Home Business
Atari Writer £39.99
Visicalc (Disk) £49.99
Timewise (Disc) . £19.99
And many more.

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd.

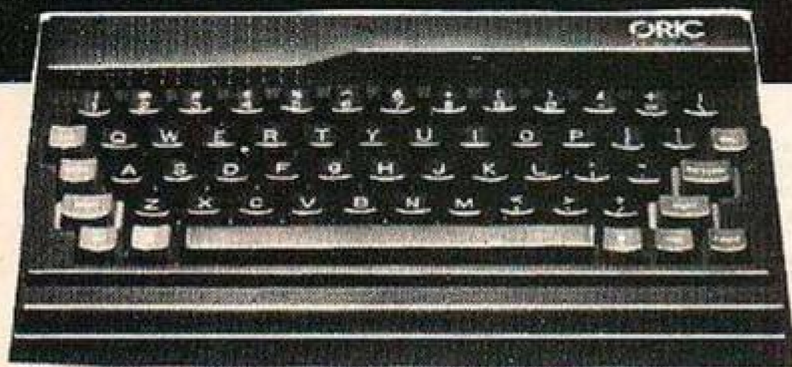
Computer Dealers

or prospective dealers. If you would like to know more about becoming a SPECTRUM APPOINTED DEALER on an exclusive area basis please write to: Bob Cleaver Spectrum Group PLC, Hunting Gate Hitchin, Herts SG4 0TJ Tel: (0462) 37171

More from Spectrum...

spectrum

Oric Atmos



The Oric Atmos boasts a powerful ROM for those demanding tasks that normally cut into a micro's memory - like colour capability (8 graphics, 8 background), powerful sound synthesis and high-resolution graphics. This keeps most of the ATMOS's valuable 48K RAM free for other tasks.

There's a typewriter style keyboard, it's directly compatible with most domestic cassette players, a built in RS232, and there's a wide choice of software.
• Full-featured keyboard with sculptured keys • Seperate keys for cursor control • Built-in speaker • Special sound effects for game programmers • Lots of exciting programs available • Built-in centronics printer interface

SPECTRUM PRICE

Check with your local dealer for our super low price!

Spectravideo 328



• 80K RAM - expandable to 144K
• 32K ROM - expandable to 96K
• Full 87-key wordprocessor type keyboard
• 16 colour graphics 3-channel sound
• CP/M compatible

SPECTRUM PRICE £199.95

Memotech MTX512



16 User definable Function Keys • 12 Key Numeric Pad • Z80A at 4MHz • 24K ROM containing MTX BASIC • MTX NODDY FRONT PANEL DISPAY • ASSEMBLER/DISASSEMBLER Video Display Processor with 16K video-RAM • 64K User RAM Twin RS232 Communications Board ROM Expansions Node Systems • MTX PASCAL • MTX FORTH Eight User Definable Virtual Screens • Up to 32 SPRITES

SPECTRUM PRICE £275

Warehouse Clearance!

Sensational value for money



ORIC-1 16K

Sensational Spectrum Price

SAVE £44 Previous Price £99.95

£55.95

Disc Drives

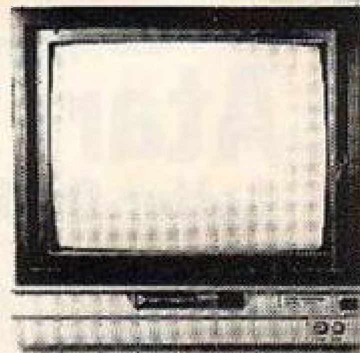
Commodore 1542	£229.00
Cumana CSX 100	£129.95
Cumana CS100	£159.95
Cumana CD800S	£419.95
Opus 5401	£149.95
Opus 5802	£199.95
Opus 3402 3"	£229.95

Quickshot MkII Joystick



SPECTRUM PRICE £11.95

Monitors



Commodore 1701	£230.00
Sanyo 12" Green	£90.85
Fidelity CM14	£199.95
Sanyo CDD 3125NB Colour	£228.85
Sanyo 14" Colour TV	£199.95
Microvitec Cub	£228.85

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE



Up to £1000 Instant Credit

• There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR - 29.8%

Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

There's a Spectrum near you...

AVON

BATH Software Plus, 12 York St Tel. (0225) 61676
WESTON-S-MARE K & K Computers, 32 Alfred St Tel (0934)419324

BEDFORDSHIRE

DUNSTABLE Dormars 7-11 Broad Walk Tel (0582) 65515
LEIGHTON BUZZARD The Computer Ctr at Milton Keynes Music, 17 Bridge St Tel. (0525)376622
LUTON Terry-More, 40 George St. Tel (0582) 23391/2

BERKSHIRE

BRACKNELL Computer Centre, 44 The Broadway Tel (0344) 427317
SLOUGH MU Games and Computers 245 High St. Tel (0753) 21594

BUCKINGHAMSHIRE

BLETCHLEY Rams Computer Centre, 117 Queensway Tel (0908) 647744
CHESHAM Reed Photography & Computers, 113 High St. Tel (0494) 783373

CAMBRIDGESHIRE

CAMBRIDGE K P Computers Ltd 19/23 Market St. Tel (0223) 312240 (Open 6 Days)
HUNTINGDON T.S.C. Electronics 3 All Saints Passage, High St Tel (0480) 411579
PETERBOROUGH Ptbrgh Communications, 91 Midland Rd. (0733) 41007

CHANNEL ISLANDS

GUERNSEY Gruts, 3-5 The Pollett, St Peter Port. Tel (0481) 24682
JERSEY Audio & Computer Centre, 7 Peter St, St Helier Tel 0534) 74300

CHESHIRE

ALTRINCHAM Mr Micro 28 High St Tel (061) 941 6213
CREWE Microman Unit 2, 128 Nantwich Rd. Tel (0270) 216014
ELLESMERE PORT RFR Computers, 1 Pooltown Rd. Whitby. Tel 051 356 4150
MACCLESFIELD Camera & Computer Centre 116 Mill St. Tel (0625) 27468
STOCKPORT Wilding Ltd 1 Little Underbank Tel (061) 480 3136
WARRINGTON Wildings, 111 Bridge St. Tel (0925) 38290
WIDNES Computer City, 78 Victoria Road Tel (051) 420 3333
WILMSLOW Swift of Wilmslow 4-6 St Annes Parade Tel (0625) 526213

CLEVELAND

MIDDLESBOROUGH McKenna & Brown, 206 Linthorpe Rd. Tel (0642) 222368

CORNWALL

ST AUSTELL A B & C Computers, Duchy House, 6 Lower Aylmer Sq. Tel (0726) 67337
TRURO Truro Micro Ltd, Unit 1, Bridge Hc., New Bridge St. Tel (0872) 40043

CUMBRIA

BARROW-IN-FURNESS Barrow Computer Centre 2/4 The Mall. Tel (0229) 38353
CARLISLE The Computer Shop, 56-58 Lowther St. Tel (0228) 27710
PENRITH Penrith Communications, 14 Castlegate Tel (0768) 67116 Open Mon-Fri till 8pm
WHITEHAVEN P D Hendren 15 King St. Tel (0946) 2063

DERBYSHIRE

ALFRETON Gordon Harwood 69-71 High St. Tel (0773) 832078

DEVON

EXETER Seven Counties (Computers) Ltd. 7 Paris Street. Tel (0392) 211211
EXMOUTH Open Channel, 30 The Strand Tel (0395) 264408
PLYMOUTH Syntax Ltd., 76 Cornwall St. Tel (0752) 28705
TIVERTON Actron Micro Computers, 37 Bampton St. Tel (0884) 252854
TORQUAY Devon Computers, 8 Torhill Rd. Castle Circus Tel (0803) 526303

DORSET

BOURNEMOUTH Lansdowne Computer Ctr 1 Lansdowne Crescent. Tel. (0202) 20165

DURHAM

DARLINGTON McKenna & Brown, 102 Bondgate. Tel (0325) 459744

ESSEX

BASILDON Godfreys 28-32 East Walk, Tel (0268) 289379
BASILDON Godfrey's Computer Centre, 5 Laindon Main Centre Laindon Tel (0268) 416747
CHELMSFORD Maxton Hayman Ltd 5 Broomfield Rd. Tel (0245) 354595
COLCHESTER Brainwave 51 Head St. Tel (0206) 561513
GRAYS H Reynolds 79 Orsett Rd Tel (0375) 5948
ILFORD Woolmans, 76 Ilford Lane Tel (01) 478 1307
SOUTHEND Computer Centre 332 London Rd. Tel (0702) 337161

HAMPSHIRE

BASINGSTOKE Fisher's, 2-3 Market Place. Tel (0256) 22079
PORTSMOUTH (Waterlooville) G B Microland, London Rd., (Opp Co-op) Tel (07014) 59911
SOUTHAMPTON RJ Parker & Son Ltd., 11 West End Rd. Bitterne Tel (0703) 445926
SOUTHAMPTON L.T.C. Ltd., 112 East St. Tel (0703) 333958/24733
WINCHESTER Winchester Camera & Computer Centre, 75 Parchment St Tel (0962) 53982

HEREFORD

HEREFORD Melgray Hi-Tech Ltd, 49 Broad St. Tel (0432) 275737

HERTFORDSHIRE

HITCHIN GK Photographic & Computers, 68A Hermitage Rd. Tel (0462) 59285
POTTERS BAR The Computer Shop, 197 High St. Tel (0707) 44417
ST ALBANS (Herts) Clarks Computer Centre 14-16 Hollywell Hill Tel (0727) 52991
STEVENAGE D J Computers, 11 Town Square. Tel (0438) 65501
WATFORD SRS Microsystems Ltd. 94 The Parade, High St. Tel (0923) 26602
WELWYN GARDEN CITY D J Computers, 40 Fretherne Rd., Tel (07073) 28435/28444

HUMBERSIDE

BEVERLEY Computing World, 10 Swaby's Yard Dyer Lane Tel (0482) 881831
GRIMSBY RC Johnson Ltd., 22 Frengate, Riverhead Centre Tel (0472) 42031
HULL The Computer Centre, 26 Anlaby Rd Tel (0482) 26297

ISLE OF MAN

DOUGLAS T H Colebourn Ltd 57-61 Victoria St. Tel (0624) 3482

ISLE OF WIGHT

COWES Beken & Son 15 Bath Rd. Tel (0983) 297181

KENT

BECKENHAM Supa Computers Ltd., 425 Croydon Rd., Tel (01) 650 3569
BROADSTAIRS Video Vision 19/20 Willow Court, St. Peters Park Road Tel (0843) 63284 (No Early Closing Day)
BROMLEY Computers Today 31 Market Square Tel. (01) 290 5652
CANTERBURY Cbury Computer Centre 55/57 Palace St. Tel (0227) 62101
DOVER Kent Photos & Computers, 4 King St. Tel (0304) 202020
GRAVESEND Marshalls Computers & Cameras, 3 Windmill St. Tel (0474) 65930
RAINHAM Microway Computers Ltd., 39 High St. Medway Towns Tel (0634) 376702
SEVENOAKS Ernest Fielder Computers Dorset St. Tel (0732) 456800
SITTINGBOURNE Computers Plus, 65 High St. Tel. (0795) 25577
TUNBRIDGE WELLS Modata Computers Ltd. 28-30 St. Johns Rd. Tel (0892) 41555

LANCASHIRE

ACCRINGTON PV Computers, 104 Abbey St. Tel (0254) 36521/32611
BLACKBURN Tempo Computers 9 Railway Rd. Tel (0254) 691333
BURNLEY IMO Computer Centre 39/43 Standish St. BB11 1AP Tel (0282) 54299
PRESTON Wildings 49 Fishergate Tel (0772) 556250

LEICESTERSHIRE

MARKET HARBOROUGH Harborough Home Computers, 7 Church St. Tel (0858) 63056

LONDON

E6 Percivals 85 High St. North East Ham Tel (01) 472 8941
E17 Erol Computers Ltd., 125 High Street Walthamstow Tel (01) 520 7763
EC1 Pedro Computer Services Ltd. 47 Clerkenwell Road Tel (01) 251 8635
EC2 Devron Computer Centre 155 Moorgate Tel (01) 638 3339/1830
N14 Logic Sales 19 Broadway, The Bourne, Southgate Tel (01) 882 4942
N20 Castlehurst Ltd. 1291 High Rd. Tel (01) 446 2280
NW4 Da Vinci Computer Store, 112 Brent St. Hendon Tel (01) 202 2272
SE1 Vic Odden's 6 London Bridge Walk. Tel (01) 403 1988
SE9 Square-Deal, 373-375 Footscray Rd. New Eltham. Tel (01) 859 1516
SE15 Castlehurst Ltd., 152 Rye Lane, Peckham Tel (01) 639 2205
SW16 Buffer Micro Shop, 310 Streatham High Rd Tel (01) 769 2887
W1 Computers of Wigmore St., 87 Wigmore St. Tel (01) 486 0373
W1 Sonic Foto & Micro Centre, 256 Tottenham Court Rd. Tel (01) 580 5826
W1 Ransons 4 Edgware Rd. Tel (01) 724 2373

GREATER MANCHESTER

BOLTON Wilding Ltd., 23 Deansgate. Tel (0204) 33512
MANCHESTER Lomax Ltd., 8 Exchange St. St. Ann's Square. Tel (061) 832 6167
OLDHAM Home & Business Computers Ltd., 54 Yorkshire St. Tel (061) 6331608
ROCHDALE Home & Business Computers, 75 Yorkshire St. Tel (0706) 344654
SWINTON Mr Micro Ltd., 69 Partington Lane. Tel (061) 728 2282 Late Night Friday
WIGAN Wilding Ltd. 11 Mesnes St. Tel (0942) 44382

MERSEYSIDE

BIRKENHEAD Fairs Cameras & Hi-Fi, Dacre Hill, Rock Ferry. Tel (051) 645 5300
HESWALL Thornguard Computer Systems, 46 Pensby Rd. Tel (051) 342 7516
HUYTON Ian Houghton 5 Huyton Hey Rd. Tel (051) 489 5785
LIVERPOOL Beaver Radio 20-22 Whitechapel Tel (051) 709 9898
LIVERPOOL (Aintree) Hargreaves, 31-37 Warbreck Moor Tel (051) 525 1782

MIDDLESEX

HARROW Camera Arts, (Micro Computer Division) 42 St Ann's Rd Tel (01) 427 5469
TEDDINGTON Andrews, Broad St. Tel (01) 977 4716
UXBRIDGE J K L Computers, 7 Windsor St. Tel (0895) 51815

NORFOLK

FAKENHAM Fastview, 12 Norwich Rd. Tel (0328) 51319
NORWICH Norwich Camera Centre 20 White Lion Str. Tel (0603) 612537
NORWICH Brainwave 11A Castle Meadow Tel (0603) 663796
THETFORD C B S Micros, 21 Guildhall St. Tel (0842) 61645

NORTHAMPTONSHIRE

NORTHAMPTON Dormans 22 Princes Walk Grosvenor Centre Tel (0604) 37031

NOTTINGHAMSHIRE

NOTTINGHAM Jacobs Computers, 13 Middlegate Newark Tel (0636) 72594
WORKSOP Computagrafix 132 Bridge St Tel (0909) 472248

NORTHERN IRELAND

BELFAST Arthur Hobson Ltd., 37 Great Victoria St. Tel (0232) 246336
PORTSDOWN Pedlows, 16 Market St., Craigavon County Armagh Tel (0762) 332265
LONDONDERRY Foyle Computer Systems 3 Bishop St. Tel (0504) 268337
NEWRY Newry Computer Centre 34 Monaghan St. Tel (0693) 66545

NORTHUMBERLAND

MORPETH Telerents 31 Newgate St Tel (0665) 513 537

OXFORDSHIRE

ABINGDON Ivor Fields Computers 21 Stert St. Tel (0235) 21207
BANBURY Computer Plus 2 Church Lane Tel (0295) 55890
OXFORD Ivor Fields, 7 St Ebbes St. Tel (0865) 247082

SCOTLAND

ABERDEEN North East Computers, 1-3 Ellis St., Peterhead Tel (0779) 79900
AYR Vennals, 6A New Bridge St. Tel (0292) 264124
DUMFRIES Vennals, 71 English St. Tel (0387) 54547
EDINBURGH The Silicon Centre 6-7 Antigua St. Tel (031) 557 4546
GLASGOW Victor Morris Ltd., 340 Argyle St Tel (041) 221 8958
HAMILTON Tom Dickson Computers, 8-12 Cadzow St. Tel (0698) 283193

SHROPSHIRE

SHREWSBURY Computerama, 13 Castlegate Tel (0743) 60528
TELFORD Computer Village, 4 Hazeldine House Telford Town Centre. Tel (0952) 506771

SOMERSET

TAUNTON Grays 1 St James St. Tel (0823) 72986

STAFFORDSHIRE

STAFFORD Computerama, 59 Forgate St. Tel (0785) 41899
STOKE-ON-TRENT Computerama, 11 Market Square Arcade Hanley (0782) 268620
STOKE-ON-TRENT The Microchip, 37 Station Rd. Biddulph Tel (0782) 511559

SUFFOLK

BURY ST EDMUNDS Guildhall Cptr Ctr. 11 Guildhall St. Tel (0284) 705772
IPSWICH Brainwave, 24 Crown St. Tel (0473) 50965
LOWESTOFT John Wells 44 London Rd North Tel (0502) 3742

SURREY

CAMBERLEY Camera Arts (Micro Computer Division), 36 High St. Tel (0276) 65848
CHERTSEY Chertsey Computer Centre 1 Windsor St. Tel (09328) 64663
EPSOM The Micro Workshop 12 Station Approach Tel (03727) 21533
HASLEMERE Haslemere Computers, 25 Junction Pl. (Adj. Rex Cinema) Tel (0428) 54428
RICHMOND Crest Computer Services, 6 Hill St. Tel (01) 940 8635
WALLINGTON Surrey Micro Systems Ltd., 53 Woodcote Rd. Tel (01) 647 5636
WOKING Harpers, 71-73 Commercial Way. Tel (04862) 25657

SUSSEX

BEXHILL-ON-SEA Computerware, 22 St Leonards Rd. Tel (0424) 223340
BOGNOR REGIS Bits & Bytes High Str., Tel (0243) 867143
CRAWLEY Gatwick Computer Services, 62 Boulevard Tel (0293) 37842
LITTLEHAMPTON Alan Chase Ltd., 39 High St. Tel (09064) 5674

WALES

ABERDARE Inkey Computer Services Ltd., 70 Mill St. The Square Trecynon Tel. (0685) 881828
ABERYSTWYTH AberData at Galloways, 23 Pier St. Tel. (0970) 615522
CARDIFF Randall Cox, 18-22 High St Arcade Tel (0222) 31960
LLANDUDNO (Gwynedd) Computer Plus Discount, 15 Clonmel St. Tel. (0492) 79943
NEWPORT (Gwent) Randall Cox, 118 Commercial St. Tel (0633) 67378
PEMBROKE Randall Cox, 19 Main St Tel (064) 682876
WREXHAM T E Roberts 26 King St Tel (0978) 364404/364527

WARWICKSHIRE

NUNEATON Micro City 1A Queens Road Tel. (0203) 382049
RUGBY The Rugby Micro Centre 9-11 Regent St. Tel. (0788) 70522

WEST MIDLANDS

COVENTRY Greens, 22 Market Way Tel. (0203) 28342
DUDLEY Central Computers, 35 Church Hill Precinct. Tel. (0384) 238169
WALSALL New Horizon Computer Centres, 1 Goodall St. Tel. (0922) 24821
WEST BROMWICH Bell & Jones, 39 Queens Square Tel (021) 553 0820

WORCESTER

KIDDERMINSTER Central Computers, 20-21 Blackwell St. Tel (0562) 746941
WORCESTER David Waring Ltd. 1 Marmion House High St. Tel (0905) 27551

YORKSHIRE

BRADFORD Erricks, Fotosonic House Rawson Square Tel. (0274) 309266
DEWSBURY Home & Business Computers, 59 Daisy Hill Tel (0924) 455300
DONCASTER The Soft Centre 8 Queensgate Waterdale Centre Tel (0302) 20088
HUDDERSFIELD Richards (Formerly Laskys) 12 Queen St. Tel (0484) 25334
HULL Computer Centre 26 Anlaby Rd. Tel (0482) 26297
LEEDS Bass & Bligh, 4 Lower Briggate. Tel (0532) 454451
YORK York Computer Centre 7 Stonegate Arcade. Tel (0904) 641862

POWERSOFTWARE IS HERE...

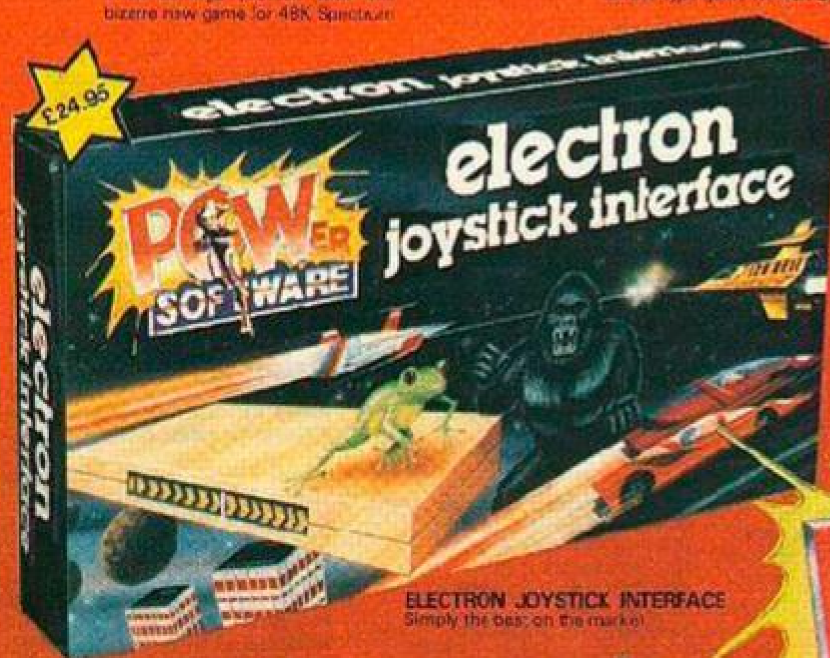
TEN GOLD SOVEREIGNS MUST BE WON!



CAT WALK
Ever wished you were a cat / ....
Then unhinge yourself with this bizarre new game for 48K Spectrum



BILLY BLUEBOTTLE
An amazingly original multi level arcade type game for 48k Spectrum



ELECTRON JOYSTICK INTERFACE
Simply the best on the market

"WIN"
A GOLD SOVEREIGN
special introductory offer you may find a gold sovereign in one of these games
10 gold sovereigns must be won





FRANTIC FINGERS
A games control utility for the B.B.C. Micro



BOUNCING BERTY / ESKIMO CAPERS
Introducing our special high class budget series for 16/48K Spectrum

Interrupting all games programmers
... "Send us your Games !!"...

Cat Walk, Billy Bluebottle, Bouncing Berty, Eskimo Capers, Incorporate English, French, & German Instructions.

Available from all red hot dealers or Powersoftware
Thinking about moving home because my local dealer's useless dept.

post orders to:
Powersoftware, 12 Hagley Road, Stourbridge, West Midlands DY8 1PS
Cheques or Postal Orders made payable to Powersoftware.

☐	Billy Bluebottle	£ 5.95
☐	Cat Walk	£ 5.95
☐	Electron Joystick Interface	£24.95
☐	Frantic Fingers	£ 3.99
☐	Bouncing Berty/Eskimo Capers	£3.50
	Cheque/Postal Order Total Value	£

Name ....
Address ....
Block Capitals

All prices include postage & packing.

Delivery 30 days

"Reg. in England No. 1370177"



PROGRAM TO PROGRAM YOU



Here is an interesting idea which came to me after I had finished reading a short story by my favourite author J. G. Ballard, called *The Sub Liminal Man* — the story is in a collection called *The Disaster Area* published by Triad Panther in 1979.

The story involves the erection by a government of huge subliminal advertising signs along the roadside. The signs are ostensibly for air-traffic control but are actually flashing subconscious messages to the drivers passing them. The general public is generally unaware of this true meaning of the roadside objects but an acquaintance of the hero in the story realises the true purpose of the signs by scaling one of them and, using a stroboscope, synchronises the latter with the on/off flashing of the subliminal message.

To get back to the main subject of the letter, my idea was to write a routine to flash a suitable message on the T.V. screen and then erase it before the viewer has time to consciously read the message but not before the message registers subconsciously.

The resulting interrupt driven machine-code routine is shown here for use on a 16 or 48K Spectrum.

Type in the short Basic program — listing 1 — which will work for both 16 and 48K machines. After saving the Basic listing, Run the program and save the generated code using:

SAVE "SUB" CODE 65129,256 (48K)
SAVE "SUB" CODE 32348,256 (16K)

Rand USR 65254 will turn the (32473 for 16K) routine On — every six seconds, a message will be printed then erased.

Rand USR 65261 will turn the routine off — 32480 for 16K. Any 32 character message could be inserted between addresses 65222 to 65253 inclusive — 32441 to 32472 for 16K. Simply Poke the character code for your message into those addresses.

Although subliminal advertising is, presumably, against the law, I am tempted to think that, having often seen computer game reviews containing such lines as . . . "unreasonably addictive and compelling etc", maybe the programmer had included in his program a routine such as mine, containing the subliminal message. "Have another go". An interesting idea, isn't it?

A. Sheppard,
Burnley, Lancashire.

RELATIVITY

Bill Bennett's review of the Einstein was less complimentary than others that I have read. I share some of his reservations about it eventually being fully CP/M compatible, and its rather disappointing colours. He has a right to his opinions about the manuals — and Jeffrey Archer! — but many users prefer a straightforward manual to one written to be entertaining!

What is unfair is that he blames the computer for his own programming mistakes. It is perfectly possible to draw a diagonal line provided you realise that the background colour is set by Bcol and not the second parameter of TCol. He also implies that like the Spectrum it is impossible to put more than two colours onto an 8 by 8 pixel grid. You can, in fact put all 16 if you really wish to do so! This one liner will put all 16 colours into an 8 by 8 grid in the middle of the screen.

FOR N = 0 TO 7: VPOKE N + 3200,15:
VPOKE N + 10392, 30*N + 15:NEXT

I also feel that he implies that XTAL basic is not suitable for beginners. For most things that beginners and even slightly more advanced programmers will want, XTAL is standard apart from Listing which is easy to operate, and KBD and Inch which with its various Gets and Inkeys is far from standard in Microsoft.

It is surely an easier language than the BBC for a beginner trained on some dialect of Microsoft. Arguably, it is a better language than the BBC but this is dismissed without comment by Mr Bennett.

Why shouldn't the Einstein be an educational computer? As a teacher I would certainly prefer it to the Apples we have got, and the tape driven BBCs that we haven't. But then teachers can't be choosers!

Geoffrey T Childs,
Winchcombe.

WORD GAMES

Creating word games is something that can be done on a computer, but there doesn't seem to be much commercially published software in this area. In order to remedy that, I'm putting together a collection of programs myself, including my own version of Parker Brothers' Boggle. I intend making these programs generally available.

Your Computer readers who would like to contribute to the collection — any computer, any language — should contact me. Others who just like to play word games and want more information should send a self-addressed envelope to Eric Balkan, 14704 Seneca Castle Ct, Gaithersburg MD 20878 U.S.A. telling me what computer they own.

Eric Balkan,
Gaithersburg,
U.S.A.

Listing 1.

```
  5 REM SUBLIMINAL MESSAGE
 10 DATA "F3EED5C5F53A785CFE013
003CD7FFEF1C1D1E1C33800052011004
821C6FEC5E5"
 20 DATA "D56E2000292929EB21000
C19C1D5050087E1223141OFAD1E11323C
110E1CDB3FE"
 30 DATA "1100480A6PAC5D50608AF1
21410FCD113C110F2C901000030B78B12
0FBC9425559"
 40 DATA "204E4F572120594F55522
0434F4D50505544C0220425559204E4F5
721203E03ED"
 50 DATA "47ED5EC93E3EED56ED47C
9"
 90 CLEAR 32347+32781*(PEEK 237
31>128)
100 LET A=10: LET B=11: LET C=1
2: LET D=13: LET E=14: LET F=15
110 LET ADDR=1+PEEK 23730+256*P
EEK 23731
120 FOR N=1 TO 5
130 READ A$
140 POKE ADDR,16*VAL A$(1)+VAL
A$(2)
150 LET A$=A$(3 TO )
160 LET ADDR=ADDR+1
170 IF A$<>"" THEN GO TO 140
180 NEXT N
200 IF PEEK 23731>128 THEN STOP

210 POKE 32474,40
220 POKE 32361,114: POKE 32362,
126
230 POKE 32410,176: POKE 32411,
126
```

MORE LIVES

Having just hacked my way through Ultimate's great game Sabre Wulf, I have discovered a few things that your readers may be interested in. These are infinitive lives, any amount of initial lives and no limit on gained lives — you can normally have a maximum of only nine at a time. Here is how to add these features:

1. Load the first part of Sabre Wulf, stop tape and press Break.
2. Type:
   POKE 23756, 1: Clear 65535
3. Edit the line, move the cursor to the end and delete the
   PRINT USR 23424
4. Add line 10 with any of the following Pokes:
   POKE 43575, 255 for infinitive lives, one player.
   POKE 45520, 255 for infinitive lives, two players.
   POKE 45599, 255 for number of initial lives — 1 to 255.
   POKE 41725, 255 for no limit on gained lives.
5. Next add line 20:
   20 PRINT USR 23424
   and finally Run to load in the rest.

Potential hackers will find a good monitor / disassembler essential. I use Hisoft's DEVPAC3 which is well worth the money.

Jeremy Dicox,
Dorchester,
Dorset.

BASICALLY BAD

We buy *Your Computer* from time to time because we feel it is the only computer magazine which is devoted to home computer users only. But recently we have noticed that the overall message of the magazine has changed for the worse. We noticed several examples of this in the July issue.

Being a magazine which caters for home computer users, you should, we think, try to encourage readers to use computers intelligently. Why then do you publish two articles on extending Basic? By merely looking at the listings for these extensions it is plainly obvious to anyone but the naive that Basic is not designed to be an extensible language. The very fact that one has to delve into the dreaded machine code just to add a few commands to this so-called language proves our last statement.

We feel your magazine is becoming too Basic-orientated. For example, in John Dawson's article about second-hand micros, there is a paragraph which reads as follows:

". . . computers . . . are sold . . . because their owner . . . has played some games, tried a little Basic programming and moved on to something else."

In the First Bytes section, somebody says that he has learnt Basic pretty well and wants to move on to machine code. Apart from the fact that learning machine code is a step backwards in terms of computer literacy and that Basic is a bad thing to learn in the first place, you failed to suggest useful alternatives such as learning Forth or Pascal. Also in the

included problem, you mention that you will make allowances for speed differences between Basics. What if someone wants to write the program in Algol or Logo? Why Basic? Anyway, if efficiency is to be measured, it would be more sensible to work out how many instructions each program executes than to time each one.

Basic is the worst possible language for beginners. It shows people exactly how not to program. By using incomprehensible Gotos instead of control structures like Begin . . . While . . . Repeat or Case, users will never be able to learn proper programming techniques. We think that you should try to promote proper computer languages such as Forth, Logo and Pascal.

One thing that pleased us was the presence of an article about Forth. Unfortunately, however, it totally missed the point and left us Forth users extremely upset. The way in which the If statement works is absolutely pathetic. It shows total ignorance on the part of Brian Watson.

To conclude, we think that publishing nothing but articles about Basic and Basic programs shows total impercipience as far as computer literacy is concerned. In the early editions of *Your Computer* there were articles about pocket calculators and there were more serious reviews of computers.

A. Hegedus and D. Sutton,
East Sheen,
London.

CORRECTIONS

The 1k resistor is missing from the circuit diagram in Richard Hine's article in September. It should be connected at one end to the 5v line. The other end should then go to the D6 line to the computer shown on the far right of the circuit diagram.

The software from the article can be bought with the computer keyboard and music keyboard versions both on one cassette. The price is £6.90 and can be purchased by mail order from Bridge Software, 36 Fernwood, Marple Bridge, Stockport, SK6 5BE.

Some of the characters in the listing for September's Oric game, Mad Jump, were corrupted, and some lines have been broken up before the end. The last two items of line 210, for example, should read: #E9,0. Throughout the listing substitute the hash character for the pound sign. Other corrections are given here:
60#A5
100 163. #A2, 109
230 ignore the dash
390#C8
710#8D, 215

In our July issue we featured an article about an adventure game entitled "The Beanstalk". In the same issue there was an advertisement by Thor (Computer Software) Co. Ltd. for a graphical adventure arcade simulation called "Jack and the Beanstalk". We are pleased to confirm that there is no connection between these two tapes, apart from the well known fairy tale and regret any confusion that might have been caused by the publication of the article and the advertisement in the same issue of our magazine.

EDITORIAL

YOU HAVE JUST INVENTED the world's most desirable computer and have decided to call it something punchy like the Tebbit EMX. What chance would this wonder machine have in a battle for world domination against the Sinclairs, Commodores and Acorns?

The answer is that it would be an enormous success — providing of course that you had a bank vault full of crisp 10-pound notes plus an unlimited fund of goodwill and confidence from the software houses and the big high-street stores.

As a hardware manufacturer even as recently as four years ago you could have started small by building a few machines in your garage. After all, that is the way Apple started in 1976. The two friends who founded that company raised the huge funds they needed by selling an aging van and a programmable calculator. The firm is now worth more than $1 billion.

If you have always fancied your chances in the dangerous software game it still would have been possible up until a year ago to have launched your programming venture from a back bedroom with a couple of games sold mail order.

But now the stakes have changed. In 1984 you need not only a well-structured company to survive but also the confidence of all the other powerful forces in the market. If your new computer is to succeed you will probably find that large amounts of financial backing will come in useful. The sort of low prices at which a manufacturer like Sinclair can buy components such as chips come from the vast orders he places. You too will need enough money to compete with the other hardware giants and still have enough spare at the end to spend your way out of problems.

Yet if you think that you are having a hard time starting from scratch, imagine the problems of taking over a company like Atari which has all the right credentials for success but which has fallen on hard times. But before you are overcome with pity for the company that lost $539 million in 1983, remember who is now at the helm.

By the time Jack Tramiel unexpectedly resigned from Commodore — the company he started — in January after 25 years, he had persuaded a lot of people to see what he meant by his famous "business is war" slogan. Now that he has picked up Atari for $240 million he remains true to that.

Far from withdrawing Atari from the front line to regroup and lick its financial wounds, he has instead ordered a full charge on the enemy artillery — and it's clear that he sees the main enemy as Commodore.

He seems to be planning the kind of price war blood-letting that will make what has happened up to now look like *Play School*. With that sort of ruthlessness as your opposition perhaps it is for the best that your home-grown computer is unlikely to make much of an impact.

In any case it is no longer possible to draw up a blue-print for a winning formula any more. Even products from companies with the financial muscle and the technical and marketing know-how are failing to make the impression one once would have expected. Sinclair's high-specification QL, beset by initial production problems, seems to have got off to a disappointingly sluggish start.

How to write for *Your Computer*

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticism of machines and software in general. If you would like to see your name in print, whether on a Software File program or a full-blooded article, here is how to go about it. Ideally, all articles should be typed double-spaced on one side only of uniform sheets of paper. If listings can be dumped directly from a printer — you can always use a friend's or user group's — this minimises the risk of error. In a perfect world a cassette would accompany the article. That considerably speeds up the checking process. Not only do you get to air your own discoveries and opinions, but we will even pay you for the privilege. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

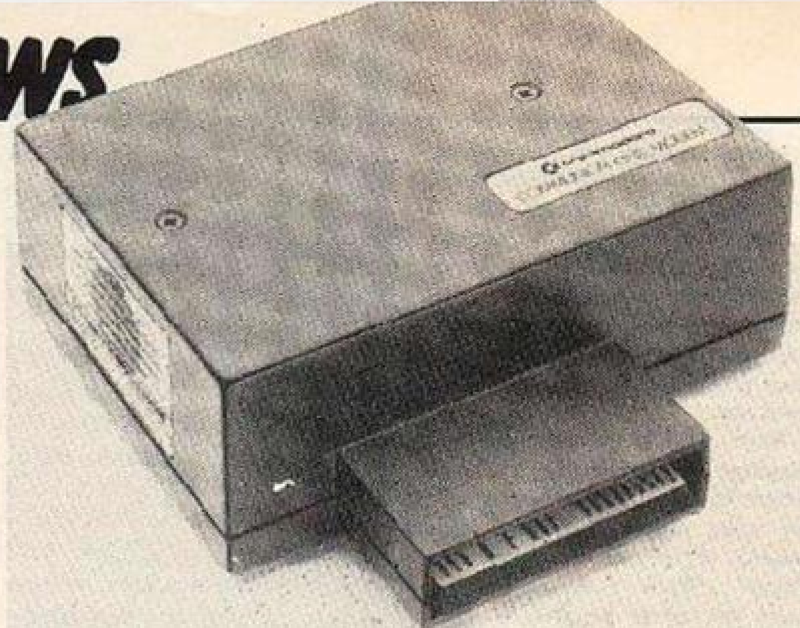
Why not give it a try? You have nothing to lose but your postage.

Editor
TOBY WOLPE
Assistant Editor
MEIRION JONES
Software Editor
SIMON BEESLEY
Production Editor
IAN VALLELY
Sub-editor
PAUL BOND
Editorial Assistant
LEE PADDON
Editorial Secretary
LYNN DAWSON
Editorial: 01-661 3144
Subscriptions: U.K. £12.50 for 12 issues.

Printed in Great Britain for the proprietors Business Press International Ltd, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Tel: 01-661 [illegible]
Telex/grams: 892084 BIPRESG. ISSN 0263-0885
Printed by Riverside Press Ltd, Whitstable, Kent, and typeset by Instep Ltd, London EC1.

ABC
154,334
January-June, 1984.

Advertisement Manager
SHOBHAN GAJJAR 01-661 3127
Assistant Advertisement Manager
NICHOLAS RATNIEKS 01-661 8548
Advertisement Executives
NIGEL BORRELL 01-661 3660
JULIAN BIDLAKE 01-661 8458
KAY FILBIN 01-661 8484
Northern Office
RON SOUTHALL 061-872 8861
Advertisement Secretary
MAXINE GILL
Classified
LUCY O'SULLIVAN 01-661 3036
Publishing Director
CHRIS HIPWELL
Your Computer, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.



Hats like this help you to Hampstead, Holmes

WHY ARE QLS like little girls and Spectrums like little boys? Because, just as out of date aunties insist on wrapping up infant males in blue and baby girls in pink so Melbourne House is using colour-coded packaging for its releases on different machines — blue Spectrums, pink Qls, Orange Acorns, green MSXs and everything else in black.

This autumn fashion collection clothes three new adventures, Hampstead — a game for social climbers, Zim Sala Bim and at long last Sherlock Holmes. Hampstead — a text mostly adventure is a thin condescending little number which allows you to climb from dole queue to Hampstead snob. If you like watching the entire televised Liberal Party conference you'll love Hampstead.

Sherlock Holmes in contrast has been well worth waiting for with an 800 word vocabulary, real Victorian



transport system — cabs and trains and all and a cast of characters, peopling screens of graphics designed once again by Mugsey man Russell Comte. Instead of Go North, Kill Dragon you can feel free to use phrases like Say to cabbie "take me to Buckingham Palace Road" or Take Chinaman's disguise or even Say to Lestrade "Basil is innocent".

Automata's weird show from birth to death

DON'T BE FOOLED by the appearances of sex, and drugs and rock and roll man Ian Dury as a sperm or ancient jokester Frankie Howerd as The Defect Police, the funny men of Automata are getting serious.



On progams like Pimaria and Groucho Automata put a program on one side of the tape and a light-hearted song on the other. Now with Deus ex Machina the two are sound and vision are synchronised into the equivalent of a concept album. Jon Pertwee of Worzel Gummidge and Dr Who fame is the main storyteller chronicling the seven ages of man while Donna Bailey gives a voice to the machine.

Along with Ian Dury and Frankie Howerd even anti-nuclear historian E P Thomson makes an unlikely entry on the sound track. On screen you have to protect a growing organism from attack as it progresses from conception to death. Deus ex Machina is more of an experience than a computer game — strangely disturbing rather than entertaining — its serious but it doesn't take itself too seriously.

Phi-mag has launched a thermal printer for the BBC to go with the Phloopy fact tape drive already announced. The £100 printer plugs straight in to the Centronics port.



Dawning of £100 discs

AQUARIUS MAKER Radofin is working on a £99 floppy disc drive for the Spectrum, Commodore 64, MSX and of course Aquarius. The drive uses a simplified tracking system and 3in. discs but it may take longer to find information on the Radofin disc than on an ordinary floppy. The Aquarius itself is now officially selling for £50.

Home modems for CBM start of something big

MODEMS IN THE HOME are respectable — and that's official. Now major home micro maker, Commodore, has at last produced its own modem. It costs £100 and is initially only available for the Commodore 64 and its pricey portable cousin the SX-64 but that does include free first year membership of Compunet. From Compunet you can download software which allows you to communicate directly with other CBM-64s which are on the phone or you can use Compunet like a mini-Prestel including limited teleshopping and telebanking. Commodore's move is persuading other manufacturers to take the plunge. Acorn is already on the way and Sinclair too, though probably not till after Christmas.

Macbeth — the Computer Game

SOMEWHERE UNDER THE CHANCEL of the Church at Stratford something stirs. Shakespeare is revolving in his grave, and no wonder, Creative Sparks is releasing a program which reduces the bard to the level of Abba — The Movie. It's called Macbeth — the Computer Game.

Just like The Hobbit, Macbeth comes on cassette along with the book of the game. There are four adventures which allow you to play Mr and Mrs Macbeth, and help the witches find the eyes of newts and toes of frogs and whatever else went in the seventeenth century equivalent of a Harvey Wallbanger.

YOUR COMPUTER TOP 20

Game	Company	Machine
Arabian Nights	Interceptor	BBC
Beach Head	US Gold	CBM 64
Decathlon	Activision	CBM 64
Decathlon	Ocean	CBM 64
Encounter	Novagen	Atari
Football Manager	Addictive Games	BBC
Frak	Aardvark	BBC
Full Throttle	Micromega	Spectrum
Jack and the Beanstalk	Thor	Spectrum
Jet Set Willy	Software Projects	Spectrum
Lords of Midnight	Beyond	Spectrum
Match Point	Sinclair	Spectrum
Micro Olympic	Micro User	BBC
Monty Mole	Gremlin	CBM 64
Psycho Shopper	Mastertronic	Vic-20
Sabre Wulf	Ultimate	Spectrum
Scrabble	Little Genius	CBM 64
Tornado Low Level	Vortex	Spectrum
Valhalla 64	Legend	CBM 64
Zaxxan	Adventure International	Spectrum

Canon's V-20 MSX micro, which will be released in a few weeks, has 64K RAM with 16K video RAM, and two cartridge slots for £280.





Chips down for Reagan

IN THE AMERICAN DREAM anyone can become President. You don't have to be brilliant, you don't even have to lie very convincingly. Last time, in autumn 1980, they elected Ronald Reagan.

This October — the election is always in the autumn hence the expression fall guy — the choice is Reagan, Mondale or you. Election Trail from Amplicon ignores the requirement and candidates be native born Americans and puts you in the shoes of a Presidential hopeful.

You have to campaign either against the computer or another player trying to raise money for publicity campaigns and whistlestop tours to swing the vote your way in every state. At press conferences it is assumed that you won't say anything outrageous — like "Bomb Russia" — but whichever of a list of innocent sounding phrases you use can have unfortunate consequences. "There are parts of the world that remain unexplored" sounds inoffensive but the press can take it as a sign that you are about to axe the space program. In some job-sensitive states that could lose the vote.

Dave Rotor who wrote Election Trail is an experienced wargamer — well, war is an extension of politics by other means — but he avoided the temptation of making Election Trail more of a shoot-em-up. There is no assassination option. The game is available from Amplicon on (0273) 608331.

Spectravideo's real MSX

WHILE MOST MSX micros will go for around £280 — £300 Spectravideo is launching a full specification 54K MSX machine for £250. Unlike the nearly MSX SV-318 and SV-328 the new SVI-728 has an MSX cartridge port.

A £100 MSX modem and £250 300K drive are also on their way from Spectravideo. The SVI has 16K video RAM separate from the main 64K RAM.

Those who bought early models of the SV-318 and SV-328 last year in the belief that they were MSX compatible may only find out now with the launch of independent MSX software how wrong they were.

Verbal tennis with Lingo

LINGO is a new computer game like Scrabble — but with words instead of letters Its inventor Alan Wakeman describes Lingo as "a verbal equivalent of tennis" but as he live in a flickering flat behind a neon sign in Piccadilly Circus he may have a slightly strange view of the world. Each player is given 12 random words and a pool of link words with which to make a sentence. Alan is hoping that Lingo will be used as the basis of a Channel 4 quiz game.

Ahoy there me hearties

CAPTAIN HOOK, Wendy and the pirates take to the rigging in Peter Pan — The Adventure Game, another computer game plus paperback package aimed at a younger audience than most. You can play the game on its own but only by reading the book can you find out what really makes the crocodile tick.

Treasure in the Microcosm

TREASURE HUNTS are always popular. After the success of Masquerade — the book which gave the clues to the whereabouts of a buried bejewelled hare, now here comes Microcosm which you could describe as Masquerade with a computer program. The book will contain a short program together with 13 sets of 13 clues which eventually should yield the telephone number of a room somewhere in Britain or the United States. In this room is a sealed envelope containing a name The first person to telephone the room and give the correct name will receive £1,000 and a trip across the Atlantic on Concorde.

New BBC is as easy as ABC

ACORN'S ABC computers are launched this month but you won't be able to buy one till January. At the bottom of the range is the ABC Personal Assistant — a repackaged BBC micro with built in disc drive and monitor, View word processing and Viewsheet spreadsheet. Seven further models all upgradable give options such as extra drives, modems second processors, Z-80 and 80286, hard discs and Apple Macintosh style icons. Acorn claims the top of the range machines are as fast as Vax minicomputers.

Commodore 64 says "I come from Hawaii"

LIFE-FORMS from Alpha Centauri based on the Commodore 64 are taking over. They look like humans, dress like humans — apart from the occasional grass skirt, and even sound a little like humans but the clinching proof is if they come up to you and says "I come from Hawaii".

The manual for Currah's new Speech 64 unit for the Commodore spends a whole page explaining how you can make the £30 synthesiser say this particularly useless phrase which is strange because none of the million pound's worth of Currah speech units they have already sold for the Spectrum have ended up in Honolulu.

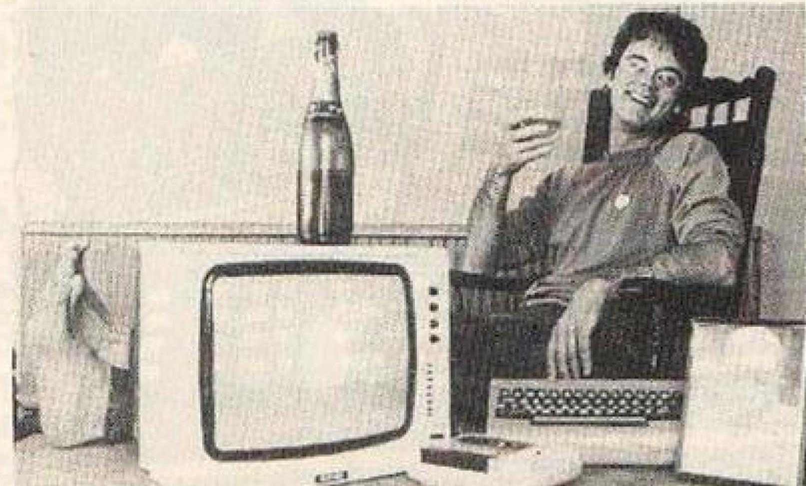
To be fair the manual also contains a program to turn your CBM-64 into a speaking clock in just 54 lines. In addition to a talking keyboard — very useful for typing in the dark — the Speech 64 has a Say command which makes a fair crack at direct text to speech.



SAY "HELLO MY NAME IS SPEECH SIXTY-FOUR" produces an intelligible sound but other every day phrases — such as "I come from Hawaii" necessitate the use of allophones — the sound components which make up human speech. On Speech 64 you can put allophones inside Say commands "I COME FROM [HAW(II)(EE)]".

There is also a choice of high and low pitched voices, intonation, and advice on machine code speech for the real fanatics.

Unemployed art graduate Hugh Riley has won the Commodore International Computer Art Challenge with an animated picture of a baby's face being irritated by a fly. The prize — £5,000 is intended to finance a course of study at a specialist computer art school — Hugh also wins £1,500 of Commodore equipment.







LOOKING FOR A HOME COMPUTER?
ALL ROADS LEAD TO MICRO POWER

MEMOTECH MTX500

ONLY ~~£275~~ £199

An excellent choice for both the beginner and the Spectrum owner wishing to upgrade.

Features: 32K, Z80A processor, SN76489A sound chip (the same as in the BBC Micro), 256 x 192 graphics resolution, 16 colours, 32 sprites (easily programmed moveable objects to make games writing easier), two Atari-type joystick ports, composite video socket, number pad. Sophisticated utilities to aid programming include built-in Assembler/Disassembler and monitor.

Complete with 5 cassettes including Draughts, Toado and a Head Cleaner.

MEMOTECH MTX512

ONLY ~~£315~~ £275

This computer has the same specification as the MTX500, but has 64K RAM (Random Access Memory).

COMMODORE 64 PLUS COMPATIBLE CASSETTE RECORDER

SPECIAL PRICE ~~£268.95~~ £229.95

Features: 64K, Microsoft BASIC, 16 colours, 8 multi-coloured sprites, sound synthesiser (producing the best sound on any micro), 320 x 200 graphics resolution, four function keys, two Atari-type joystick ports, cartridge slot, parallel printer interface.

CASSETTE RECORDERS

(All Recorders have an integral index counter.)

Acorn Recorder (including leads)	£35.00
Morwood Recorder (including leads)	£29.95
Sanyo DR101 Recorder	£39.00
Leads for above	£3.50

MAIL ORDER ADDRESS:
DEPT. YC9
MICRO POWER LTD.
SHEEPSCAR HOUSE
SHEEPSCAR STREET SOUTH
LEEDS LS7 1AD
Tel: (0532) 434006

SHOWROOM ADDRESS:
MICRO POWER LTD.
NORTHWOOD HOUSE
NORTH STREET
LEEDS LS7 2AA
Tel: (0532) 458800

MICRO POWER



BBC MODEL B *PLUS* CASSETTE RECORDER *AND* 5 MICRO POWER *OR* SELECTED ACORNSOFT TAPES

SPECIAL OFFER! £399

Features: 32K, BBC BASIC (the fastest on any home computer), 8 display modes, 16 colours, 640 x 256 high resolution graphics, 3 voice sound plus noise channel, RS423 and Centronics printer interfaces, joystick port, built-in Assembler, 10 user definable function keys. Complete with a 16 program cassette and 512 page User Guide.

ACORN ELECTRON *PLUS* CASSETTE RECORDER *OR* 5 MICRO POWER TAPES

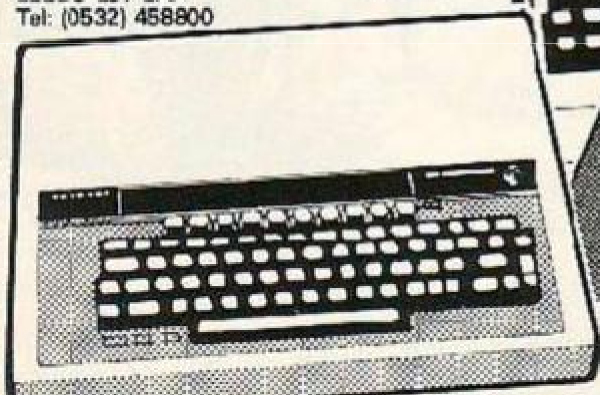
SPECIAL OFFER! £199

The scaled down version of the BBC Micro. Features: BBC BASIC, 32K, 7 display modes (including 80 column text mode and 640 x 256 graphics resolution), 16 colours, 9 octave sound plus noise channel, built-in Assembler. Complete with an Introductory Cassette containing 16 programs, a User Guide, and a book: "Start Programming on the Electron".

SANYO GREEN SCREEN MONITOR DM2112 £74.95

PRICES CORRECT AT TIME OF GOING TO PRESS. ALL PRICES INCLUSIVE OF VAT. HIRE PURCHASE AVAILABLE. PLEASE CONTACT US FOR FURTHER DETAILS. CARRIAGE FREE FOR BBC AND MEMOTECH. ALL OTHER COMPUTERS £5.00 U.K. MAINLAND ONLY. AMPLE FREE PARKING!

We also stock a wide range of printers, monitors, disk drives, joysticks, light pens, books, software and much more! Please send for our complete list.





I could do that...

The simplest method is not necessarily the fastest. That was one lesson that could be drawn from the programs submitted for July's competition.

We asked you to find the fastest way of generating all the prime numbers below 1000. A large number of programs were sent in. The great majority of them used the straightforward method of dividing each odd number in turn by all the factors up to the square root of a 1000.

Fast though some of these programs were they were not nearly as speedy as those based on the Sieve of Erotasthenes. This is a technique which has been known for over 2000 years. Instead of searching for primes it set up an array of 1000 numbers and rules out all those that are divisible — by finding the multiples of all the factors up to 31. The remaining numbers must be prime.

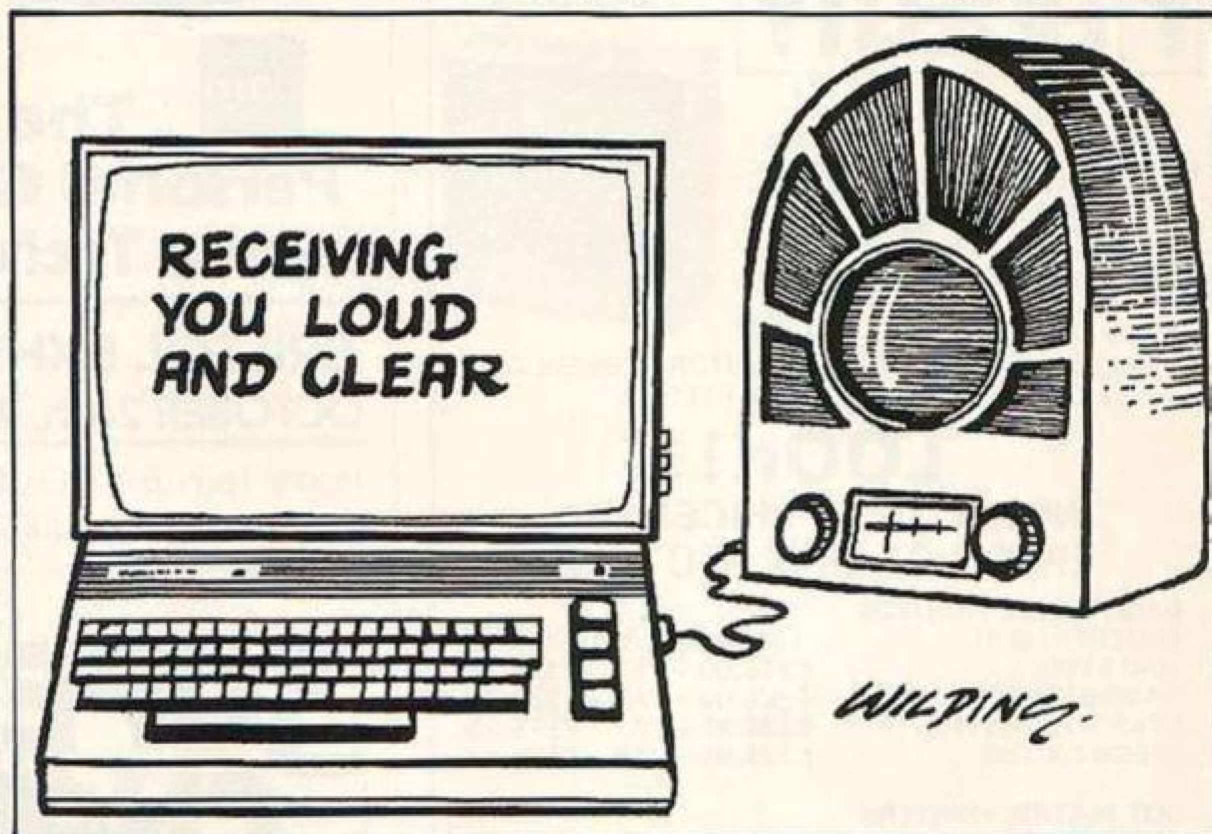
The £15 prize goes to R Oxborough, Windwhistle Cottage, Upcott Dolton, Winkleigh, Devon. His program is refined version of the Sieve and takes under 2.5 seconds to run on the BBC. We have rewritten it to make conversion to other machines easier. On the Spectrum it runs in less than 12 seconds.

```
   10 DIM S%(1000):N%=[illegible]
PRINT " 2 ";
   20 FOR P%=3 TO 31 STEP 2:IF S
%(P%)=N% THEN 100
   30 PRINT P%;
   40 FOR I%=P%+P%+P% TO E% STEP
 P%+P%:S%(I%)=N%:NEXT
  100 NEXT
  110 FOR P%=33 TO E% STEP 2
  120 IF S%(P%)<>N% THEN PRINT P
%;
  130 NEXT
```

For this month's problem we would like you to write a program to rotate a square on the screen. At the start it should draw a square. Then it should accept two inputs, one to set the centre of rotation, the other to set the size in degrees of each step.

BEGINNERS *first bytes*

Starting out in home computing? First Bytes is for you. Just write to *Your Computer* with any hardware or software problems, no matter how small or simple.



The origins of Basicode

BASICODE GREW OUT of attempts to produce programs that would run on a whole range of machines and not just the one it was written on.

Most newcomers to the world of computing discover pretty soon that you can't just buy any old program, even written in the world's most widely used language, Basic, and be sure that it will run on your particular micro — you have to make sure it's BBC Basic, QL SuperBasic, Commodore Simon's Basic . . . Isn't Basic supposed to be a universal language?

Well, yes, but unfortunately like human languages, computer ones have a habit of developing dialects. Worse, these dialects are mutually incomprehensible. What usually happens is that every manufacturer thinks it can make its Basic just that little bit better than its rivals by adding this command here, extending that one and generally tinkering around. So although all Basics have commands like Print, Goto and For . . . Next in common, the way they clear the screen may be Clear, Cls or even some fancy special button that no other machine has.

The end result of this is that there are almost always one or two commands in a program that will cause a "foreign" micro to choke when it tries to run it. Yet it seems a shame that machines that are 95 percent compatible in their Basic can't agree to compromise somehow.

In fact, they can and they do. Someone in the Dutch domestic radio service actually had the bright idea of coming up with a kind of Basic Esperanto that a large range of home micros could understand. It is called Basicode and is built up in two stages.

Every Basic has a list of commands like Print, Run and operations like +, * that it will accept as legitimate. Basicode simply selects those commands that occur in most of these lists, and discards all the really way-out versions specific to one machine. The result is shown in figure 1.

Now this is fine until you want to write a program that uses some of those missing commands. Since these include common functions like clearing the screen and generating random numbers, some way has to be found of making them available but not in a machine specific way.

The trick is to put all these machine specific commands in a separate part of the main program, and call them up by using Gosub commands to an appropriate subroutine. For example it is laid down in Basicode's rules that instead of clearing the screen using Clear or Cls, you write Gosub 100. At line 100 will be found the relevant command to clear the screen for your particular machines.

In this way all the machine-dependent commands can be stored safely away in a separate program placed in front of the main program, which in turn remains quite machine-independent. This special subsidiary program has been written for each of the machines that supports Basicode, and is loaded first before the main program is downloaded or written.

To do this in a consistent way the whole of the first 1000 lines of a Basicode program are reserved for

(continued on page 43)

(continued from page 41)

these special routines, and particular line numbers allocated to them. The main part of the program then begins at line 1000 itself.

In this way you can write and run programs for a whole range of machines provided you follow the Basicode rules for allowed commands and program structure. But there is one remaining problem: you have got to work out some way of transferring your program across without having to re-type the whole thing.

The problem here is that although most micros use the same general technique for storing programs — on cassette tapes, using audio equivalents of the 0s and 1s that make up computer programs — the details differ. In particular the frequencies used to store programs on tapes vary from machine to machine. Once again Basicode solves this by simply defining which frequencies are to be used, and writing a piece of software for each machine that converts these frequencies into those that the particular micro can handle.

Using these techniques it is possible to write and transport programs from micro to micro. In fact Netherlands Radio had rather grander schemes in mind. It originally developed Basicode to enable it to broadcast programs to computing students studying at the Dutch equivalent of Open University. The standard audio frequencies are broadcast over the air instead of being stored on tape.

ABS	LOG	TAB
AND	MID$	TAN
ASC	NEXT	THEN
ATN	NOT	TO
CHR$	ON	VAL
COS	OR	+
DATA	PRINT	
DIM	READ	*
END	REM	/
FOR	RESTORE	_
GOSUB	RETURN	=
GOTO	RIGHT$	<
INT	RUN	>
IF	SGN	<>
INPUT	SIN	<=
LEFT$	SQR	>=
LEN	STEP	
LET	STOP	

Table 1. Basicode's permitted Basic commands and operations.

This is a very simple process, but does have the disadvantage of being vulnerable to errors through poor reception. It is also awful radio if you have the misfortune to hear it rather than feed it to your computer. For this reason transmissions tend to be short and at anti-social hours where the number of listeners to be annoyed is minimised.

This is the approach adopted by Radio Four's computer programme The Chip Shop, which has exclusive rights in this country to Basicode for transmission. Basicode programs are broadcast in the early hours of Saturday and Sunday morning, at 5.55 am. To receive the transmissions all you need is a radio and the appropriate Basicode kit for your home micro.

These cost £3.95 and are available for a range of machines including the Apple II, BBC, Electron, Commodore 64, Dragon, MSX, Oric and Spectrum. Basicode kits and more information are available from Broadcasting Support Services, PO Box 7, London W3 6XJ.

BEGINNERS

first bytes

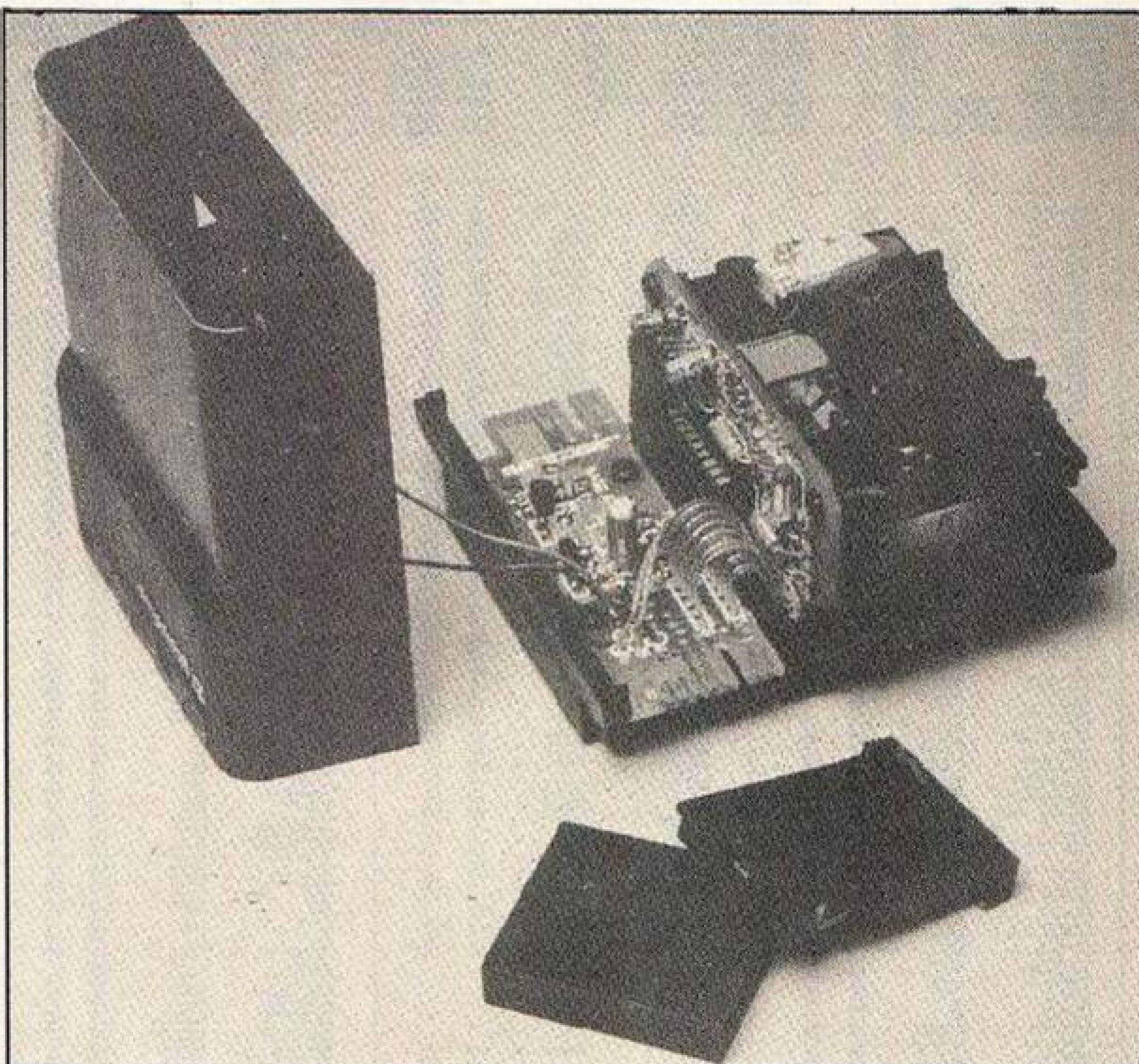
Storage medium

WHEN IT COMES to buying storage for your bright new micro, you rather find yourself between the devil and the deep blue sea. On the one hand tape cassettes are just about everything a storage medium should not be: slow, unreliable and low in capacity. They are, however, cheap and can be used with pretty well any micro.

Sleek and shining disc drives, on the other hand, typically cost over £100, and are not available for every machine. But they are fast, relatively safe and have increasingly large storage capacities — anything up to 800K nowadays.

Uncle Clive noticed this dilemma too and came up with a typical solution for his Sinclair micros: Microdrives. These micro cassette cartridges are claimed to offer at least 85K of storage with access times of a few seconds.

Their secret is the continuous loop of thin videotape they contain, about 18 feet long. Working on the principle of the now-defunct audio cartridge systems, tape emerges from the centre of a spool, and is wound back on to the outside. The tape is specially coated to ease its passage.



This design avoids the problem of having to rewind at the end of a tape: there is no end. So when you are loading a program or trying to find a file, the micro can search through the whole continuous loop until it finds it, going back to the beginning if necessary. Because there is no end, a much higher tape speed can be used, which in turn means better search and loading times.

Though an improvement, this sequential type of searching is still nowhere as efficient as the so-called "random access" method of a disc drive, where you can jump to any part of the storage without having to pass through all the regions lying inbetween.

This continuous loop sounds fine in theory but in practice there are one or two problems. First, the fact that the tape is continuously pulled from the centre of the spool means that it is under stress. Initially it stretches under these forces, so it is necessary to format the tape several times to iron out all this movement.

This does have the advantage that the capacity increases as the tape gets longer. But, the fact that the tape is under these kind of stresses and moves so quickly — much faster than ordinary audio tapes — means that the danger of mechanical failure is greater. This rather rules out 'serious' applications like accounts, where data safety is vital.

So why even consider this hybrid form? First, because potentially it offers a marked improvement over the slow and inefficient audio cassettes, but for less than the price of a disc. Unfortunately, Sinclair has rather spoiled things by overcharging for the Microdrive cassettes — currently a ludicrous £4.95, though there are hints that his will come down soon.

You also need special Microdrives which are extra. Secondly, microdrives are likely to become a much more popular form of distributing software now that the QL has arrived.

THOUGHTS & CROSSES

37 MARKET STREET, HECKMONDWIKE, WEST YORKS.

Telephone 0924-402337

ALL PRICES INCLUDE VAT AND DELIVERY

COMPUTERS

BBC B £399
(Free software £50 + Free)
BBC B with DFS £469
Electron £189
Spectrum 48K £125
(Free software worth £57)
Memotech 512 .... £275
Commodore 64 .... £185
Oric 1 48K £89
Limited number available
Apple IIe with Disc
Drives 2 & Controller £985

PRINTERS

Canon PW1080A NLQ £305
Canon PW1080A NLQ
+ QL RS232 Interface £350
Canon PW1156A NLQ £380
Canon PJ1080A (colour) £399
Canon RS232 Interface £80
Epson RX80 .... £269
Epson RX80FT £299
Epson FX80 .... £389
Epson FX100 .... £520
Epson DX100 .... £475
Brother HR5 .... £155
Brother EP44 .... £235
Juki 6100 .... £375
NEC PC8023 .... £210
Shinwa CP80 .... £199
Shinwa RS232 + 2K buffer £54
Commodore 1520 p/p £95
Commodore MPS801 .... £210
Alphacom 32 .... £59
MCP 40 .... £119
Riteman A1 .... £249
Riteman RS232 Interface £39
Epson RS232 Interface £29
Epson RS232 with 2K buffer £65

DISK DRIVES

Sinclair Microdrive £45
Sinclair Interface 1 .... £45

Pace or Cumana

All with separate PS
100K S/S 40T £149
200K D/S 40T £173
400K D/S 40T £215

Double Drives

200K S/S 40T £265
400K D/S 40T £329
800K D/S 80T £417
800K D/S 40/80T £478
3" 200K D/S £125
Commodore 154210
Torch Disk Pack
with free software £800
Memotech Single
inc free software £410
Memotech Double
inc free software £800
6502 2nd processor £115
Z80 2nd processor
inc free software £265

Wabash or 3M Disks

5¼" or 8"
S/S S/D 40 track £17
D/S S/D 40 track £20
D/S D/D 40 track £22
D/S D/D 80 track £28
3" Maxell £4.50
3½" Hewlett Packard £4.50
Further discounts for quantity.
50+ 10% discount.
100+ 15% discount.

MONITORS

Microvitec 1431MS (std) £199
Microvitec 1451MS (med) £290
Microvitec 2031 20" £299
Microvitec 1451MZ £245
Microvitec QL (med) £275
Philips TP200 Green
Antiglare £76
Commodore 1701 .... £210
Fidelity £210

CASSETTE RECORDERS

Commodore C2N £40
Ferguson £27.50
Benkson £25
Bell & Howell 3179CX £39
Panasonic £30

JOYSTICKS & INTERFACES

Quickshot 1 .... £11
Sure Shot £15
Stak BBC Dragon,
Spectrum or Commodore
Pro Ace £9
Zip Stick £12
Kempston 5000 .... £11.50
Cambridge Joystick £29
+ interface and program
Kempston Interface £11.50
DK Tronics Programmable £22
DK Tronics Dual Port £13
Shure Shot Interface £29
First Byte Interface £24

DESKS

Opus Model 1 .... £110
Opus Model 2 .... £130
Opus Model 3 .... £130
Opus Model 4 .... £110
Opus Model 5 .... £150
Opus Model 10 .... £208

BBC

Electron Plus 1 .... £55
The Key (disk) £11.50
Replica 2 (disk) £10.50
Replica 2 (3" disk) £13
Graikey £8
Graildisk £11.50
Beta-Base (disk) £22
Beta-Base (3" disk) £22
Wordwise £40
Disk Doctor £30
Gremlin £30
Caretaker £32
B.C.P.L. £95
Acorn Speech Rom £54
View £65

P.V.C. COVERS

BBC £3.99
Microvitec 14" £4.80
Acorn Electron £2.99
BBC Cassette Rec £2.90
Spectrum £1.99
VIC 20/64 .... £2.99
Epson FX80 .... £4.80
Epson RX80 .... £4.30
Apple £4.50
Apple + Monitor £6.75
Seikosha 80 .... £3.50
Seikosha 100 .... £3.75
Over 40 different covers
available. Phone for
availability and price
BBC B Hard cover (plastic) £9.90

RIBBONS

Epson MX/FX/RX80 .... £6
Epson MX/FX100 .... £15
Seikosha GP £4.50
Microline £2.30
Anodex £12.50MPS801 .... £6.50
NEC 8023 .... £7
Canon PW1080 .... £11
Canon PW1156 .... £11
Epson 100 Refill £3.30

LEADS

BBC to Parallel Printer £10
BBC to Serial Printer £10
RS423 5pin DIN to 5pin DIN £4.50
RS232 'D' to 'D' £13.50
Memotech Printer Lead £10
Dragon to Parallel Printer £13.50
Commodore to Parallel Printer £13.50
Oric to Parallel Printer £13.50
Pet to Parallel Printer £13.50
Atari to Parallel Printer £13.50
BBC to Single Disk Drive £13
BBC to Dual Disk Drive £16
BBC Single Power £5
BBC Dual Power £5.50
7pin DIN to DIN & jack £2.40
7pin DIN to 3 jacks £2.40
5pin DIN to 5pin DIN & jack £2.40
5pin DIN to 3 jacks £2.40
Sinclair 48K cassette lead £1.90
RGB monitor (6pin DIN) £1.70
The Plug suppressor
and RF filter £16
Spectrum on/off switch £3.99

SPECTRUM

Spectrum Amplifier £10
Light Pen £18
Keyboard £45

COMMODORE 64

[illegible]

SPECTRUM

[illegible]

SPECIAL

[illegible]

Range of programs available for MTX, BBC and Electron

Please order stating (1) Programs required; (2) Computer; (3) Amount enclosed; (4) Name & Address.
All prices include, packing & VAT. Overseas orders welcome.

If you have anything of interest to tell us about your computer club why not contact us on 01-661 3144.

Local news

Guildford

New venues and new contacts for the West Surrey Computer Club, featured in our April 1984 visit. WSCC now meets on the second Thursday of the month at the Stoke Hotel, Guildford. They also have a BBC user group meeting every third Friday at Guildford County College of Technology. Contact John Stokes on Guildford 38947 for more information.

Daventry

The Daventry and District computer club are so new they don't appear to have a phone number. Contact A F Powell, The Daventry and District Computer Club, c/o The Daventry Ex-Serviceman's Club, Market Square, Daventry, Northants.

Belfast

Mr D Johnston is secretary of a new Lynx Club. For an annual membership of £10, a magazine will be published on a two-monthly basis. Contact Lynx Club, 14 Aardvarna Crescent, Belfast BT4 2GJ.

Morden

The new secretary and contact for the Forth Interest Group is now Douglas Neale, 58 Woodland Way, Morden, Surrey. The group still meets on the first Thursday in each month in room 307 of the Polytechnic of the South Bank at 7pm. Membership is around 700 people.

Biesme

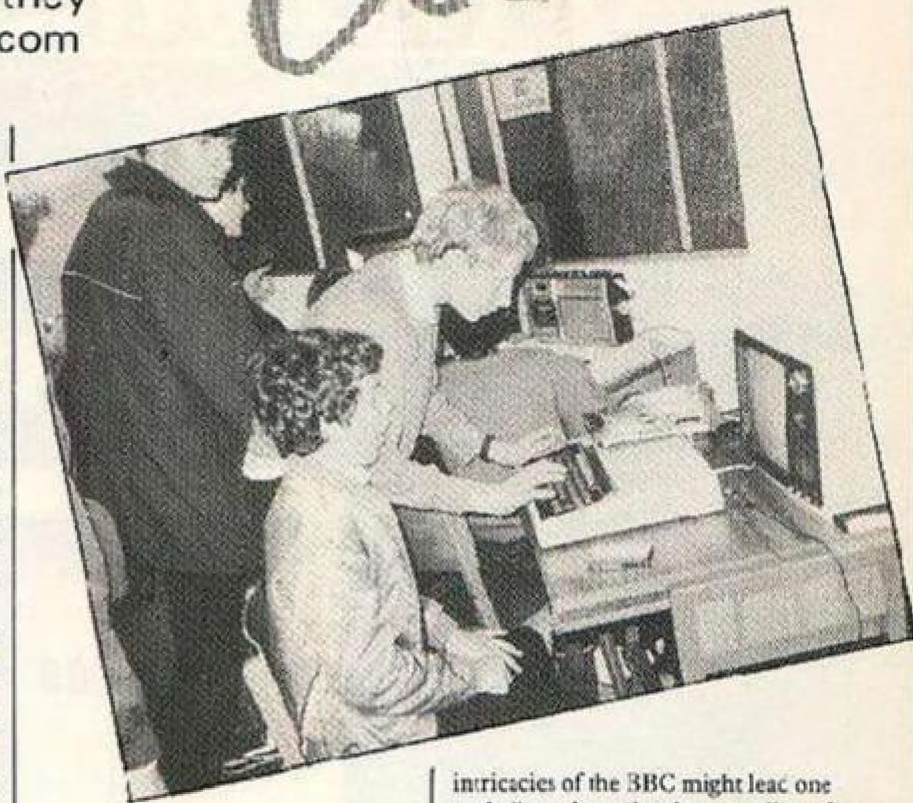
CUFO is a Belgian computer club. Club de Utilisateurs Francophones de l'Oric was founded two years ago for French speaking Oric users. They publish a paper entitled "La Puce." Contact T Grosbols, CUFO, Rue ce la Tourette 1, 5650 Biesme, Belgium.

COMPUTER club

An out-of-breath Paul Bond visits Crowborough computer club to meet Megamouth and his mates and finds out how they proved British Telecom wrong.

IT'S A LONG HAUL up the hill from Crowborough station — which doesn't appear to be particularly near Crowborough — but only 150 yards from the town crossroads in Park Road can be found the CCA hall where the local computer club meets. Remarkably often, in fact.

"We meet three times a month", club secretary Bruce Piggot explained. "The first Tuesday of every month is usually seniors, the second is open to all-comers, the fourth tends to be juniors. Every so often there is a fifth Tuesday, of course. You need a computer to work it out."



Indeed Mr Piggot has employed his own BBC Micro to compile a database of the 60-70 club members. "I wrote it in Basic, because the idea was to make it easily transportable. This way if anyone wants to implement it on their own machine, we can discuss different approaches. There was no point in putting it on disc drive because not many other members have discs at the moment. Luckily we all just fit into the machine's memory."

The club was formed about 18 months ago after a foray across the border into Tonbridge, Kent where the local computer club used to meet in a pub. "The biggest surprise when we formed this club in Crowborough was how young the members were," continued the club secretary.

Roger Gannans, representative of the young tendency and reputedly nicknamed "Megamouth" by his mates, had developed a procedure enabling transfer of information from one BBC Micro to another. While his intimacy with the intricacies of the BBC might lead one to believe he existed on a diet of Acorn manuals, the club has plenty of other talented programmers.



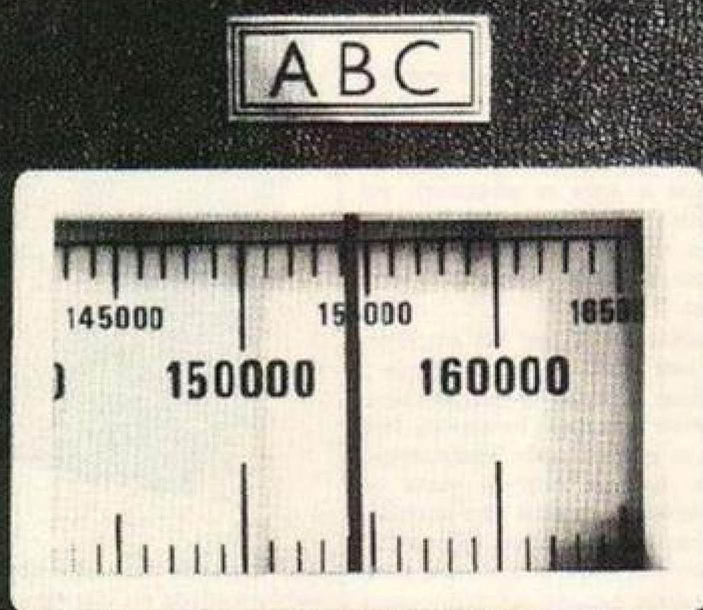


Robert Fenton, improvising on a BitStick theme, had developed an imaginative Paintbox program featuring rubber-banding and a special five-pointed cursor to enable greater precision of drawing. He hoped to develop it for use with joystick and Grafpad. "He kept losing the tapes" explained Roger. "Every time he re-wrote the program, it got smaller and more efficient." Apparently we may be seeing the young Mr Fenton in print in one of the specialist Acorn mags.

Club activities include bring'n buy sales and demonstrations of new equipment — they got hold of Microdrives very early on. An on-going project concerns the development of software for modems for deaf people. "There is no way you can get British Telecom approval for direct-connection modems. You have to buy acoustic couplers and write the software yourself."

One thing the club did succeed in doing — contrary to BT advice: they said it couldn't be done — was to use a payphone for networking. "The obvious problem is the pips — you have to load it up with cash first. We set up all the equipment here and received and sent messages to a member who was in his house ready to participate in the experiment." For more information about the club, contact Bruce Piggot on Crowborough 62970.

Britain's biggest selling computer magazine has put on 26% more weight



(It must be all those chips.)

It's hardly surprising that the ABC figures for January – June 1984 show yet another leap in circulation for Your Computer, to 154,334.

The fact is that more people find it more to their taste than any other computer magazine.

Not that all these extra readers are going to cost our advertisers any more. Because Your Computer's cost-per-thousand has actually fallen to just £5.05.

For more details contact Shobhan Gajjar on 01-661 3127 and he'll explain why other home computer magazines could well have had their chips.

YOUR COMPUTER

ELECTRICAL-ELECTRONIC PRESS
A DIVISION OF BUSINESS PRESS INTERNATIONAL LTD

Star★chart

Catwalk

ZX Spectrum
£5.95
Eat-'em-up
★ ★ ★

Snocky the voracious cat has to be guided around the screen, munching mice, dodging dogs and ducking brickbats. That's only the first screen and there are eight more including one where Snooky has to break into an Air Force base akin to Greenham Common. Nothing startlingly original but a promising start from this new company.

Uncle Claude

BBC B
£6.95
Beat-em-up
★ ★ ★

Micro Micky has to stop Uncle Claude from withholding supplies of electrical equipment by getting the stuff onto a conveyor belt at the bottom of the screen. Dodge flying computers and send Claude reeling off the screen by pushing a micro into him. One of the best satirical arcade-type games around.

Electro Freddy

Amstrad CPC464
£6.95
Beat-em-up
★ ★

Same author as Uncle Claude for the BBC and pretty much the same game. Stuff for the Amstrad so far has been fairly tame so this is a pleasant change. Flicker-free graphics on the 464 too.

SOFTWARE Shortlist

Wunda Walter!

Vic-20 + 16K expansion
£6.00
Interceptor Micros
★ ★

DIS FE DA GAME of Wunda Walter. Apart from inducing dyslexia, this is the kind of Defenderesque dodge-the-nasty game which could well lead to a higher incidence of people sitting on trains slowly revolving their heads and quacking like ducks.

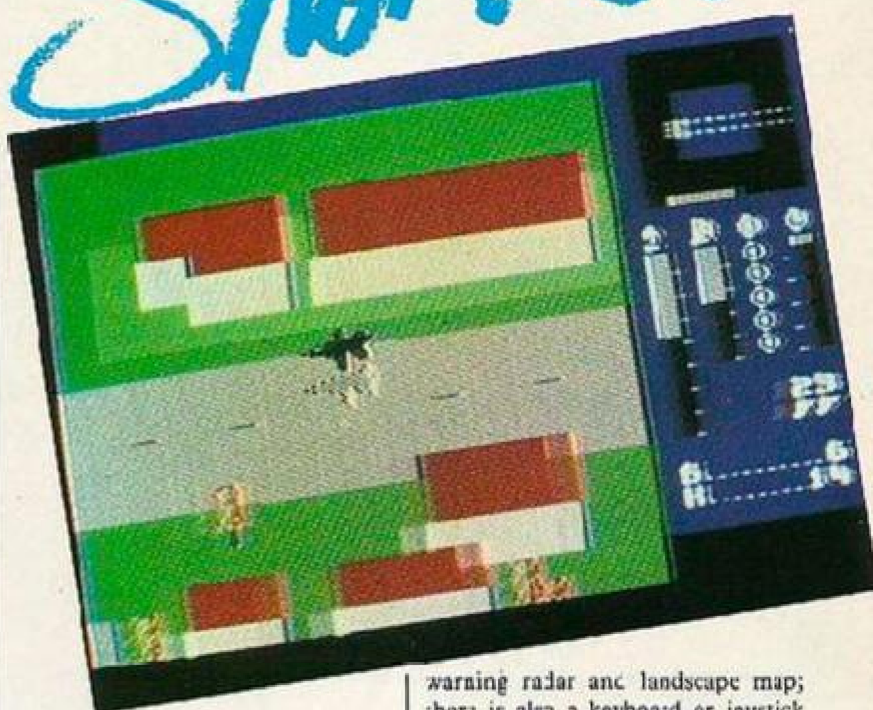
Walter is a lovable green balloon — don't laugh, some of my best friends are green balloons — who bounces across the surface of formerly peace-loving planet Plato, now pock-marked with more volcanoes than there are spots in an O-level study class. The screen shows a side-view of this scenario, as in Defender.

Fuzz-balls are wreaking havoc on Plato; it's Walter's task to step on them. He is assailed by waves of flying false teeth and periodic volcanic eruptions can pop his body. Body-popping is also practised by manic depressive mutants although you don't encounter them until you have clocked up a high score and a long period of survival.

The base of the screen features a scrolling, eventually repetitive, commentary on the action: "Hey Granma! It's time to soak ya teeth!" and so on. Walter is kept floating by fitful manipulation of the fire-button — this is a joystick-only game — and bursts on the slightest provocation. We found it difficult to devise any strategy with which to approach the game — but this could be a good thing if you like the totally unpredictable.

What seemed really illogical, at least in the review copy, was the facility to type in your initials, accompanied by a hearty "Yer did good!" There is no Hall of Fame. You just type your initials in and you never see them again. Should appeal to those of you who like keeping lights under bushels.





Tornado Low Level

Spectrum 48K
£5.95
Vortex Software
★ ★ ★ ★

A TERRAIN HUGGING mission in which you control a swing-wing fighter bomber charged with obliterating enemy ground targets. Shadow graphics are what make this game. The screen picture shows an aerial view of the craft below you moving across the terrain. This is the viewpoint that, in reality, would probably be shared by defence aircraft carrying the look-down radar that would aid in the destruction of a Tornado engaged in such a foolhardy low-level penetration mission.

Nevertheless, this is a tough exercise in co-ordination and judgment, even though there are no ground defences or enemy aircraft to obstruct you in your mission. First, you must fuel up. Then you scoot off the runway — it is possible to land and refuel at any time so you can prolong the action for as long as you wish.

By pressing the fire-button it is possible to sweep your wings back for supersonic speed. When attacking targets, which appear as small circles with a central dot, all you have to do is descend to the right altitude, make a low pass directly over the target zone and it will be destroyed automatically. Not as easy as it sounds; you must watch out for power-pylons, trees, houses and other assorted ground clutter which traditionally do little to enhance the aerodynamic qualities of an aeroplane flown directly into them. Program options include advance warning radar and landscape map; there is also a keyboard or joystick option. The multi-screen wrap around landscape is vast. Challenging, but in view of the lack of defences, to be viewed more as an aerobatic exercise. Excellent graphics and it would make sense for Vortex to improvise on this theme in future programs. Perhaps they should join the helicopter craze!

White Lightning

48K Spectrum
£14.95
Oasis Software
★ ★ ★ ★

WHITE LIGHTNING is the most extensive and effective games writing package yet to appear. Oasis have had the clever idea of adapting Forth to meet the needs of the games writer. The program is a version of Fig-Forth, greatly extended by a hundred commands for manipulating graphics.

Forth is well suited for creating games. It is almost as fast as assembly language but easier to use and has the great merit of allowing you to define new commands.

The bulk of the extra commands provide the Spectrum with an impressive sprite facility. Not only can you define the dimensions of your sprite but once created you can enlarge it, invert it or reflect it, and even spin it. To design sprites there is a sprite generator program together with a set of 167 pre-defined characters.

There are also commands to create screen and sprite windows, which can then be swapped around or scrolled in any direction. But perhaps the most useful feature is the

(continued on page 49)

Star★chart

Billy Bluebottle
ZX Spectrum
£5.95
Arcade survival
Powersoftware
★ ★ ★

Tough three-screener from Walters Computing Services' new baby. Our superfly has to save a colleague drowning at the bottom of the screen while dodging men with aerosols and consuming large amounts of mouldering food to keep up his energy. Good graphics and all this company's titles have French and German menu options.

Air Traffic Control
ZX Spectrum
£10.00
Arcade strategy
Mikrogen
★ ★ ★

Heavy stuff. A credibly realistic simulation of area control — as opposed to approach control — over a modern airport. Black and white.

Galaxy Raiders
BBC B
£6.95
Arcade strategy
Visions
★ ★ ★ ★

If you didn't guess from the title, this is probably as close to the famed Atari Star Raiders as the BBC Micro is ever going to get. Dock with starbases, warp from sector to sector and generally keep the cosmos in order. Complex and absorbing.

(continued from page 47)
way any of these graphics facilities can be interrupt driven. Thus you can set a scrolling landscape in motion while your program attends to other tasks.

To master White Lightning you will have to work through a manual of 130 pages of fine print. And in the process you will have to learn Forth. Compared to programs like Hurg, Scope and Fifth, White Lightning is dauntingly complex. But if you want to write a game of commercial quality using a games designer, this is the one to buy.

SOFTWARE *Shortlist*



High Noon
CBM-64
£6.90
Ocean
★ ★ ★

"DO NOT FORSAKE me, oh my darling", the plaintive theme song from the famous Gary Cooper Western, High Noon, sets the scene for one of the best cowboy shoot-'em-ups I have ever seen.

You control the central protagonist with the joystick. He has to take out the tough hombres before they take out the town gold, not to mention the girls from Saucy Sue's. You steer him around the screen shooting at the trigger-happy bad-hats, who are duly taken away by the man from Rig & Mortis the Town undertaker. He performs the same service for you, if you are not quick on the draw.



To score bonus points, you periodically have the opportunity to square up man to man with one of the outlaws. When he goes for his gun, will you be able to beat him?

You can shoot at gunmen abducting young ladies from the local saloon without fear of injuring the relatively innocent girls and the undertaker is also invulnerable to any stray bullets.

Every so often a horseman gallops through the ville and if you can bring him down, that's also good for a bonus. In the early days of television, people used to worry that Westerns would lead to increased violence and disregard for human life. Up till now, they seem to have been absolutely right.



Terrorist
CBM-64
£7.95
Virgin Games
★ ★

YOU ARE in charge of a boat, a helicopter and a jeep. Take a dash of Mined Ott mix with two tablespoon of Hungarian originality and you have a goulash of excitement.

At the outset you are shown a map, very briefly. Then you have to go over the ground with your vehicles in order to establish the lie of the land properly. You will be told when a terrorist attack is imminent. You then hop into your helicopter and zip over to re-establish civil order in the customary way by shooting everybody.

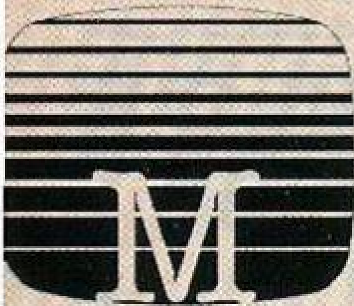
Sinbad
BBC B
£7.95
Arcade survival
Virgin Games
★ ★ ★

PARADOXICALLY HYPNOTIC, the maddening music which accompanies this game is one of its most attractive features. It bears a close resemblance to the pseudo-Egyptian sand dance so beloved of BBC researchers doing documentaries on music hall, the Windmill theatre or the history of the BBC. Its arrival on the BBC Micro in some form was inevitable, and the only surprise is that it has taken so long.

Sinbad has to leap from the base of the screen on to a rope ladder attached to a flying carpet which floats erratically — and uncontrollably — about the screen.

This is a game for peaceniks since Sinbad harbours no aggressive intentions toward the other hostile screen inhabitants: flat ovoid blobs. His task is easier than that of pacifists in the real world since all he has to do is touch them to convert them to his point of view — or at least his colour scheme.

Due to the unpredictable nature of the movement of the carpet and the fact that Sinbad falls off the rope if he touches a convert, it requires something of a top-down approach. The second screen chucks you into the usual headlong rush of asteroids.



Orders to:
Melbourne House Publishers
39 Milton Trading Estate
Abingdon, Oxon OX14 4TD

Correspondence to:
Church Yard
Tring
Hertfordshire HP23 5LU

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Trade enquiries welcome.

☐ Please send me your free catalogue.
Please send me:

SPECTRUM 48K

☐ Spectrum Mugsy 48K	£6.95
☐ Spectrum Sherlock 48K	£14.95
☐ Spectrum The Hobbit 48K	£14.95
☐ Spectrum Penetrator 48K	£6.95
☐ Melbourne Draw 48K	£8.95
☐ H.U.R.G. 48K	£14.95
☐ Abersoft FORTH 48K	£14.95
☐ Spectrum Classic Adventure 48K	£6.95

COMMODORE 64

☐ Commodore 64 The Hobbit	£14.95
☐ Commodore 64 Hungry Horace	£5.95
☐ Commodore 64 Horace Goes Skiing	£5.95
☐ A.C.O.S.+	£8.95
☐ Commodore 64 Classic Adventure	£6.95
☐ Zim Sala Bim	£9.95

BBC/ELECTRON

☐ BBC Model B The Hobbit	£14.95
☐ BBC/Electron Classic Adventure	£6.95

All versions of 'The Hobbit' are identical with regard to the adventure program. Due to memory limitations, BBC cassette version does not include graphics.

£ ....

Please add 80p for post & pack £ .... .80

TOTAL £ ....

I enclose my ☐ cheque
☐ money order for £ ....

Please debit my Access card No ....

....

Expiry Date ....

Signature ....

Name ....

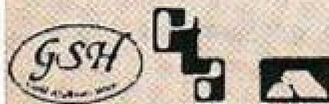
Address ....

....

.... Postcode ....

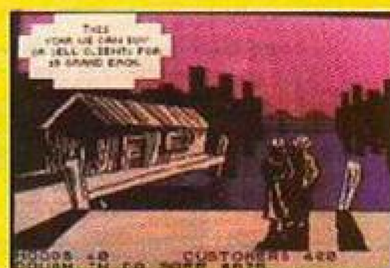
YC10A

Access orders can be telephoned through on our 24-hour ansafone (0235) 83 5006.









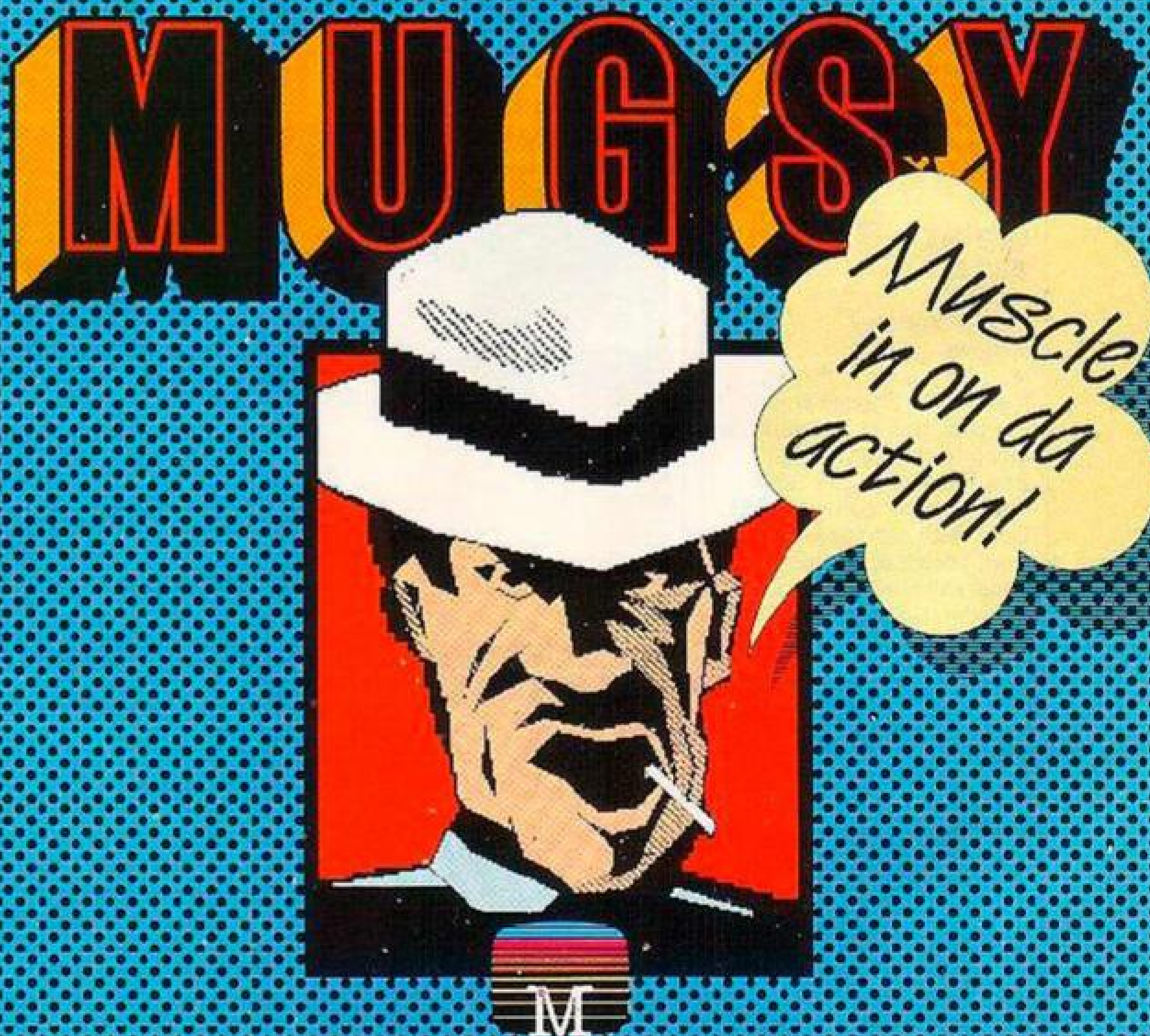
Mugsy gives a totally new direction for Spectrum thrill seekers — comic animation in text, stunning graphics and a full arcade game! Mugsy is your one and only chance to become the greatest gang leader with definite ill-repute!

"Mugsy is a real good game wiv real A1 graphics"
— Popular Computing Weekly.

"Mugsy is definitely different and the graphics are terrific" — Computer Choice.

"The graphics which were all done using Melbourne Draw are quite stunning. Not only because they are large, but because they really do look as though they have come from a comic strip" — Crash.

"Using a punchy, fast moving dialogue and stunning graphics, Melbourne House have really created an atmosphere of Al Capone and organised crime. Mugsy must still rate as Melbourne's best offering since The Hobbit"
— Computer and Video Games.



Melbourne House

QUEST

Corner

NEWS
oaeo
rssu
tttt
h h

The crystal ball

Remaining at the top of the tree for the best adventures and support service, those masters down at Level 9 Computing have now produced incredibly detailed help sheets for each of their superb games. Beautifully laid out so as to offer the maximum of assistance for any particular problem but without spoiling the rest of the adventure, these sheets are available free from them at their High Wycombe address — just make sure you send an SAE.

Duckworth's have added to their excellent series of books called Exploring adventures — versions are now out for BBC, Electron and Dragon micros, priced at £6.95.

Phipps Associates will be publishing some new Adventures which make use of text compression techniques and graphics which reflect your commands. The first will be by Mike Farley — of Knight's Quest fame — and is provisionally entitled, The Terrors of Trantoss.

A helping hand

Incredible Hulk afficionados may welcome some aid in even getting started in Scott Adams latest.

Can't get loose from the chair?
PIL ETIB – NIAP LEEF OT DEEN UOY

High gravity a crushing problem?
ECIVDA EVOBA TAEPER NEHT NOTTUB SSERP

Heros of Karn fans getting frizzled by fire should:-
NOITOP ETIHW KNIRD

Troubled by a blood-sucking nasty in the Corridor of Doom in Castle Of Riddles?
<EREHT TEG UOY EROFEB DIL NEPO>
– TNIAP WORHT

Yours in tunnels and traps.
HUGO NORTH.

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

Hulk

Spectrum 48K
£9.95
Adventure International

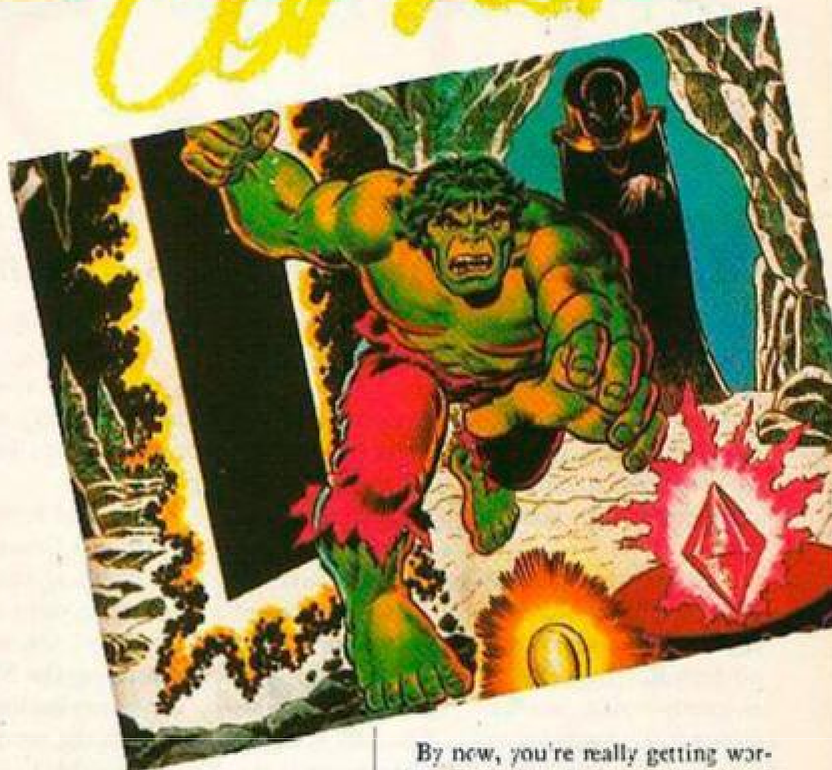
SCOTT ADAMS FANS should rejoice! The master has written this brand new adventure, the first of a series featuring characters from Marvel Comics. The next one in the pipeline features Spiderman but leading the Questprobe series is that lovable mountain of muscle, the Incredible Hulk.

The game is a mixture of text and colourful comic-strip, high-resolution graphics. There are a large number of pictures, more than one for every location, and each one filling almost the top half of the screen. The graphics appear almost instantaneously — no twiddling your thumbs while the picture is slowly and laboriously etched in.

The rest of the screen is used for text input and output, the messages scrolling upwards as more are added. Commands are the simple and traditional single or two word type, e.g. I (for inventory), Get Mirror, Go Dome, etc.

The main aim of the quest is to recover gems. In so doing, you'll meet such characters as Ant Man, Doctor Strange and a mysterious personage known as the Chief Examiner.

Apart from the impressive graphics, the fun of the game lies in trying solve Scott Adams' usual mind-bending puzzles. There are plenty of brain teasers in this adventure. Right from the start, problem follows problem; in fact, you're in trouble as soon as the game opens. There in front of you is Bruce Banner, securely tied to a chair.



Since it is Bruce — and his alternative self, Hulk — whom you have to steer through the adventure, you're going nowhere. Banner is not strong enough to break the ropes but Hulk could do it in a trice.

Having freed Banner from the chair, you will be spending the rest of the adventure switching between the two characters. It's hard to stay as the Incredible Hulk for too long — gas keeps turning you back into Bruce Banner.

The comic strip graphics are faithful to the originals and the problems are up to the usual Scott Adams' standard. This is certainly one not to be missed.



Ground Zero

Spectrum 48K
£6.95
Artic

INTERNATIONAL TENSION is at an all-time high. At home, law and order is beginning to break down as the ever-present threat of nuclear war looms closer.

This text adventure kicks off with a more comfortable comestic scene. You're in the lounge of a typical suburban semi which comes complete with floral wallpaper, foam-cushioned three-piece suite and a TV. Turn on the TV and you'll be given some alarming advice — build a nuclear fall-out shelter! Picking up the phone, you are told that all public services have been suspended.

By now, you're really getting worried. Exploring the house will reveal plenty of useful material for what looks like an emergency situation. In the garden, a high wall prevents you seeing further. However, if you shin up an apple tree, you'll spy, on the far side of the wall, old Mr Hodges, sitting in a deck-chair and staring up the sky!

A bike in the garage might come in handy but you've got to be careful where you ride it. Outside the house, all is strangely quiet though if you venture up the High Street, sounds of rioting and looting will reach your ears and you'll see soldiers walking about with rifles!

An interesting and challenging adventure with plenty going on. Response to input is instantaneous and the vocabulary seems pretty extensive.

Woodland Terror

BBC B
£9.95
MP Software

THE SUCCESSOR to the popular Firienwood, this text adventure has you searching for an evil genie who has gone on the rampage. Your task is to find the lamp and re-imprison the genie. You start by the side of a lake, in the middle of which is a ruined castle on an island. The lake seems impossible to cross until you find a novel way of removing the water!

There seem to be dozens of nasty ways of meeting an untimely end so make use of the Save and Load game features, and keep your mapwork up to date.

REVIEW

PLUS 4

Glyn Moody investigates the latest member of the Commodore family and finds they mean business.

THE PLUS 4 IS is Commodore's bid for micro respectability. It offers a 16-colour 64K 8-bit machine complete with Basic 3.5 and four integrated application packages on ROM, all for £300. When it hits the streets in October, its price and specification will make it a hot competitor with both the QL and the BBC Micro.

You can tell Commodore means business with the Plus 4 just by looking at it. Instead of the Commodore 64's flimsy construction in off-brown, the Plus 4 offers a solid and elegantly-styled machine in a no-nonsense gun-metal coloured plastic. The unit is about 12in. by 8in. by 2.5in. The processor is the 7501, a close relative to the 6502.

A separate transformer

At the back there is the power socket which connects to a separate transformer, a serial bus port, cassette output, user port, memory expansion port which doubles as a cartridge port, two joystick sockets and a Din-type video output. Both the cassette and joystick ports are different in design from the Commodore 64. In other words Commodore is up to its naughty old tricks of incompatibility again. However, it does graciously allow you to use a 1541 disc drive and all Commodore printers with the new machine.

As well as the video output there is a standard UHF socket, situated on the left of the machine. On the opposite side is the on/off switch and a reset button.

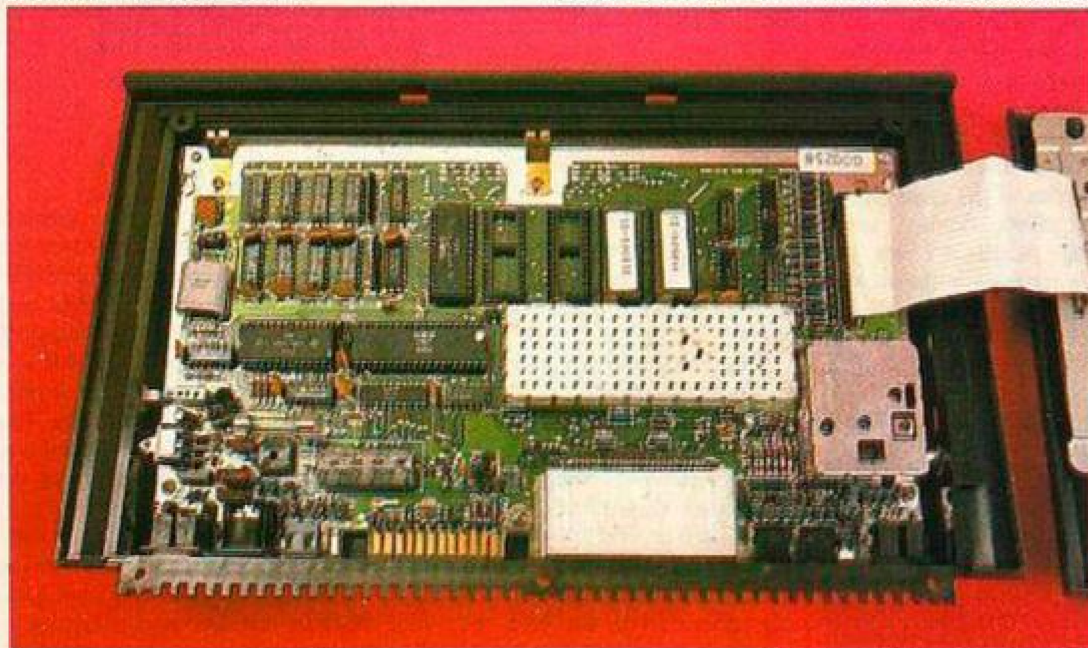
The keyboard is basically the same as on the 64, and in design is very similar to the SX-64 portable executive version. Although the keys rock alarmingly as you type, and sound like a boxful of Lego bricks, the feel is surprisingly good.

One slight inconvenience is that the Shift, Return and Control keys lie next to each other in a diagonal line, so it is easy to strike the wrong one, with drastic effects. Four function keys above the keyboard are doubled up to eight using the Shift key.

One very noticeable innovation in keyboard design is the set of cursor controls. These are now moulded as arrows pointing in the appropriate compass direction. In practice they are much easier to use in this form. Clearly the Plus 4 owes something to the new MSX machines and, in fact, the new Commodore is built in Japan.

Otherwise, the keyboard functions in the same way as the 64. Most keys have two graphics characters inscribed on them, one produced by Shift, the other by the Commodore key. This is when the keyboard is in the upper case/graphics mode produced as default on powering-up. A normal typewriter mode of upper case/lower case is obtained by pressing Shift and the Commodore key simultaneously, as on the 64.

The Plus 4 has the same 16 basic colours as the earlier machine, and they are produced using the top row of keys together with Control or the Commodore key. There are seven levels of luminance. The colours are quite strong but you may need to turn the red level up to obtain clear differentiation between some of them. The image is rock steady.





Built-in word processor, spreadsheet, database and graphics packages are accessed at the touch of a button through the four function keys.

Normal text mode

Normal text mode is 40 columns by 25 lines. As with the 64 there are two colour graphics modes: standard high-res graphics with 320 pixels by 200 pixels resolution but only two colours available within each 8 by 8 square, and the multi-colour mode where four colours are available in each 8 by 8 pixel character position, but the resolution is 160 pixels by 200. The big difference from the 64 is how you call up these modes.

In the bad old Commodore 64 days, you used the memorable:

```
POKE 53270, PEEK (53270)OR 16
```

to obtain a multi-colour graphics mode. With the Plus 4 you simply type

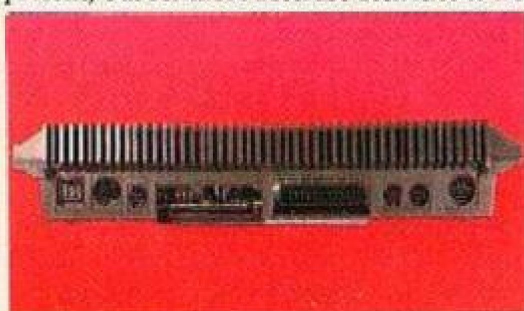
```
Graphic 3.
```

The 3 signals that you have various options

The four arrow-shaped MSX-style cursor keys at the bottom right of the keyboard make for easy movement round the screen.

— multi-colour graphics over the entire screen in this case. You can also allow for five lines of text beneath the main graphics area using Graphics 4. Graphics 1 and 2 call up high-resolution mode with and without text lines respectively; these commands replace other Pokes and Peeks.

This is the biggest single area of improvement for the Plus 4 over the CBM-64. It is probably true to say that the earlier machine was one of the Pokiest around — in many senses. The main Basic commands were present, but for more abstruse activities it was



a question of rolling up your shirt sleeves and getting in there with a Poke or two or 10.

Basic 3.5 has over 75 commands as standard. More details of some of these are given later. Suffice it to say that this is a clean Basic your mother would want you to use. Unfortunately, it is also incompatible with previous Commodore Basics.

Line editing is simple. Characters can be deleted to the left of the cursor using the Del key. By pressing Shift and Del you can insert a space. The cursor keys are used to place the cursor over characters to be changed which can then be deleted or overwritten. After a line of Basic has been altered, you enter it in its new form simply by pressing Return.

If running a program throws up syntax errors, Basic 3.5 has a neat Help facility. Pressing the function key marked Help highlights the offending part of a Basic line which speeds up program development enormously.

Another powerful feature available from Basic is the machine-code monitor, assembler and disassembler called Tedmon. A range of useful machine-code utilities are available from within this. Taken together with the extensive Basic facilities, it provides the serious programmer with an enormous repertoire of commands.

No sprite option

One omission that fans of the 64 will notice is the lack of any sprite options. Obviously, Commodore thinks this would be inappropriate on its "serious" machine. In any case the machine language facilities go some way to compensating for this. The Sound command is also more limited.

There are three voices available, two for music and one for noise; any two can be used at once. Volume is set by a command, called, appropriately enough, Volume. There is no internal speaker on the Plus 4, so the TV speaker is used instead.

A roomy 60K of RAM is available for

(continued on next page)

(continued from previous page)

running Basic programs; Basic 3.5 itself is slightly faster than the previous Commodore languages. In eight standard speed tests the Plus 4 showed an overall improvement of about 6 percent.

If that's nothing to write home about, the bundled software in ROM probably is. The four integrated programs are a word processor, spreadsheet, database and graphics — hence its name, 3 Plus 1. Integrated is one of this year's buzzwords. Here it means that you can transfer data from the spreadsheet or database to the word processor and incorporate it in a document. In fact, this is the only way you can print out spreadsheets and database files.

Commands are entered after a command prompt which you get when you hold down the Commodore key and C together. In the word processor it is W>, in the spreadsheet it is C> for calculator and, in the database, it is F> for file. Most commands consist of two letters. For example entering TC after W> takes you to the spreadsheet; pressing TF takes you to the database.

The word processor allows you to create a document 77 characters wide and 99 lines long. Only 32 characters and 22 lines are displayed on the screen. There is no visible wordwrap, that is words are broken anyhow across the end of the page. But when a document is printed the words are distributed so that only whole words appear.

Using two-letter commands you can insert and delete lines or search for words in a document and replace them. You can move whole blocks of text. You can also embed certain commands in a document using reversed characters. These do not print but affect the output in various ways.

For example, placing the word "justify" in reversed characters will ensure that the text is neatly levelled off at both right and left margins when it is printed. Using reversed-out commands you can change the position of the left and right margins. You can also link files together for printing to produce documents longer than 99 lines.

The spreadsheet displays the familiar rows and columns of cells — three columns and 12 rows normally out of a maximum total of 850 cells. Figures are entered directly, text by pressing the Commodore key and T together first.

Formulae can be set up in cells. For example 3;2 + 3;4 in a cell would add together the value in the cell at row 3, column 2 and row 3 column 4 and place it in the current cell. There is a command called Fit which allows you to replicate — that is repeat — a formula elsewhere, with the appropriate changes made automatically. Standard mathematical operators like Sum allow you to add up whole rows without having to spell out all the cells.

Perhaps the most interesting facility is the windowing which lets you display the spreadsheet and a word-processing document at the same time. To do this you have to halve the size of the spreadsheet and then call up the text using the TW command. You can then transfer figures from the sheet across to a document.

The Graph program is really only an extension of the spreadsheet. After you have set up some figures, you can use the command GR to convert them into a graph, row by row. The scaling is done automatically. The end result is rather crude and consists of stacked # symbols.

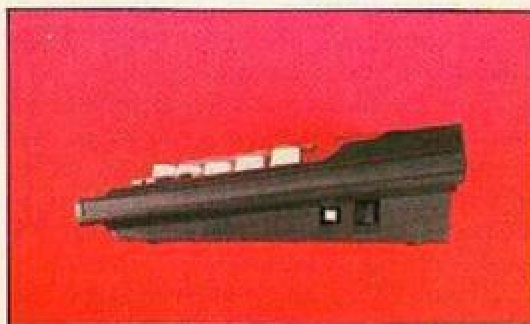
More powerful is the database facility. This is effectively a computerised card file. Up to 17 fields — that is entries on a card — may be created and up to 999 records, space permitting.

To use the database, you need a disc drive which is constantly accessed as records are created and searched. You can sort records and search through them for particular words.

One of the most impressive facilities on this database is the power to do a mailmerge — that is use a database of names and addresses, say, to fill in blanks on a standard letter, thus saving boring repetitive typing.

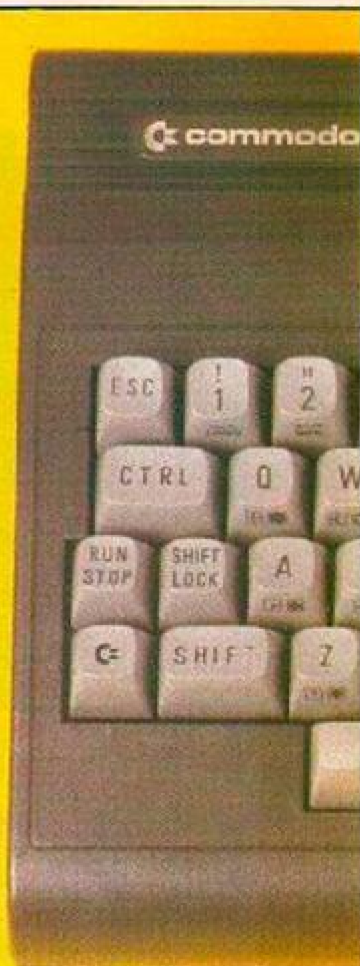
It would be unreasonable to expect miracles from four packages squeezed on to a 32K ROM. The pressure of space shows in some of the less user-friendly features and in the limitations of the applications. Nonetheless, for general home use, these programs offer the possibility of real word processing, detailed budgeting and accounts and a filing system.





CONCLUSIONS

- The Commodore Plus 4 is an excellent value quality home machine that barely puts a foot wrong. It has an elegant and powerful Basic, machine-code facilities and remarkable integrated software.
- One disappointment is Commodore's wilful decision to make it incompatible with earlier products, as regards both hardware and software. However, it will not be long before the Plus 4 generates its own large library of games and serious software.
- The tremendous range of the machine's capabilities means that it is suitable for beginners and old hands alike. The preliminary versions of the manuals were well-written, reasonably full and contained useful appendices.
- Anyone thinking about buying a QL or BBC should look closely at the Plus 4. The three machines are at their best in quite different sectors of the top-end market: enthusiast, education and home.



REVIEW

Sweet sixteen and not a key pressed. Bill Bennett introduces himself to a Commodore débutante.

AT FIRST SIGHT, the new Commodore 16 resembles the Commodore 64. It looks like last year's model in this year's colour scheme. Parked side by side on the test bench the two machines reveal some surface differences but under the bonnet there is a vast gulf between the two micros. The 64 has some wonderful hardware held back by a less than wonderful Basic, the 16 has an excellent Basic but is very much a cut-down micro.

There is no way that the 16 replaces the 64, but Vic-20 owners on tight budgets could easily be tempted to upgrade to the 16. Inside it has a fairly small circuit board that only measures 12in. by 5in. Screwed to this board is an elaborate heatsink which pays particular attention to draining the warmth from one large integrated circuit. The small board isn't a result of some breakthrough in large scale integration because there are a great deal of discrete components.

The most noticeable comparison with the 64 is that the 16 has fewer RAM chips. There is only 16K of RAM, hence the name. Also noticeable by their absence at the Commodore 16 party, are Sid and Vic, the special chips which make the Commodore 64 what it is today. These chips handle the 64's sound and graphics but appear to have been integrated a



COMMODORE 16

stage further on the 16.

Elsewhere on the circuit board is a cartridge socket which appears at the rear of the cased machine and is marked "Memory Expansion". Although it will certainly perform that task I expect it will also be used for cartridge software. The socket is dissimilar to those on the Vic-20 and Commodore 64 but it is hardly surprising as none of the machines are, strictly speaking, software compatible.

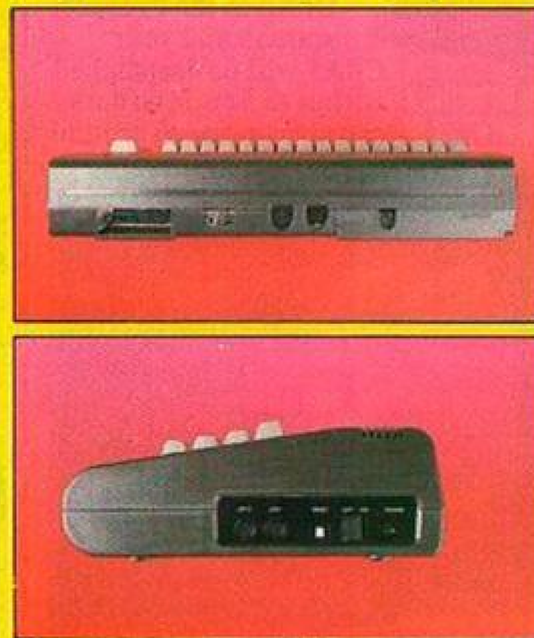
Along from the cartridge socket is the TV output and next to that a monitor output which provides compatibility with the Commodore monitor. Beside this is the serial port which is a Din socket, just the same as that on the 64. I was pleased to discover that this allows you to use the 1541 disc drive and the MPS-801 printer so anyone already committed to Commodore equipment isn't going to have to start building a system from scratch.

A different socket

The cassette port turns this last statement on its head as it is incompatible with both the 64 and Vic-20 and even the vintage Pet which could all use the same cassette drives. Unlike most other ranges of computer Commodore has always used dedicated cassette units called datasettes. Over the years the design may have changed but the interface remained the same. Now Commodore has used a different socket, a kind of miniature Din socket, which, no doubt, requires a different datasette.

Until recently, Commodore expected to sell datasettes to the majority of their U.K. computer customers, whereas in the U.S.A. far more users opted for the disc drives as a software loading and saving medium. But now U.K. owners are beginning to find the extra cash for a disc unit and the disc unit user base is growing rapidly. Commodore probably expects that purchasers of the two new machines will tend to buy discs rather than cassette units.

One unnecessary change has been the joystick ports. Previous Commodore micros used the same ports as the Atari range of computers. This may seem odd but it meant that users could buy any old joystick off the shelf. As nearly all joysticks on sale are Atari style this was an early example of the kind of standardising that doesn't happen often enough. I find this change worrying because



the old Commodore joysticks were certainly a weakness in the Commodore range. I found Commodore joysticks would sometimes disintegrate after only a few weeks use.

A computer's keyboard is very important, especially if the user hopes to do something other than just play arcade games with a machine. Keyboards have always been a strong point of Commodore's micros and here there is no exception.

Same keyboard as 64

Ostensibly, the 16 has the same keyboard as the 64. Each of the physical keys on the 64 is present here, exactly the same number of keys, identical positions and shapes. But the keys do not perform similar functions. Gone are the twin cursor keys that required shifting to move up or back across the screen. In their place are four keys each of which takes you in a different compass direction.

Gone also is the Restore key which came in very handy for returning sanity to a misprogrammed Commodore 64. Its function is more or less replaced by a reset key on the 16's right flank but its operation is different. Using the rest key will lose your program but not any high-resolution pictures.

Certain other keys have been moved about but the most obvious change is that function key seven is now labelled Help. This will almost certainly be made use of from within software packages but can also be useful when playing adventure games. On the whole I found this keyboard layout more difficult to use than that on the 64 but it may just be

(continued on page 57)



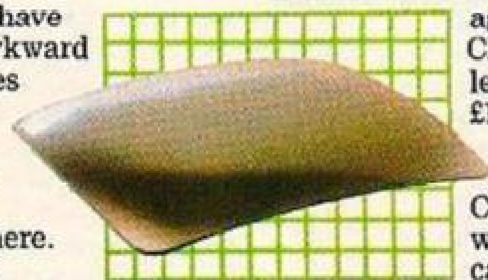
Treat your eyes to a Romag CEAF. Only £19.95

Unique technology: British made laminated glass, aspherically curved Contrast Enhancement Antiglare Filter.

Up to now, contrast-enhancing filters have always been flat—and so has their performance, because the screen of your TV, monitor or VDU is curved.

Up to now, most filters have been plastic — because it takes mindbending technology to bend optical-quality laminated glass.

Up to now, filters have been expensive — awkward production techniques have meant price tags from around £50 to well over £100.



Forget all that: the Romag CEAF is here. British designed and manufactured by space age military technologists. CEAF is profiled to fit your display screen, giving you the ultimate in contrast enhancement and antiglare performance. For under £20, this first generation of eye-friendly filters diffuses all specular reflections, gives sharper image clarity from edge to edge of the screen and greatly enhances display colours.

Mounted and removed in seconds by invisible velcro fastenings, the anti-static, anti-shatter CEAF is a major step forward in the operational safety of computer displays—unprotected screens can cause blurred vision, watery and itchy eyes, headaches and (according to such authorities as the Institute of Ophthalmology) even permanent changes in eyesight.

Scratch-resistant, durable and easily cleaned without expensive sprays and agents, 9", 12" and 14" CEAFS are available from leading retailers at only £19.95 including VAT.

Or fill in the Freepost coupon and your CEAF will be despatched within 48 hours. Orders can also be placed around the clock by phoning the CEAF Department on (091) 414 5511, quoting your Access Card number. For other screen sizes, please ring or write — the CEAF prices for 'specials' would be considered very competitive.... if there was any competition!

From Dixons • Harrods • House of Fraser Group • Laskys • John Lewis Group • John Menzies • Selfridges • W.H. Smith • and other leading homecomputer retailers.



ROAD FROG by courtesy of Ocean Software. MU 4628

To ROMAG, FREEPOST, CEAF Dept. YC, Blaydon on Tyne, Tyne & Wear NE21 4BR. Telephone: (091) 414 5511.

My TV/Monitor/VDU is: ________ (make) ________ (model) ________ (size)

My Computer is: ________ (make/model)

Please send me: ________ 9" CEAF(s)

________ 12" CEAF(s)

________ 14" CEAF(s)

at £19.95 each, inc. P&P.

I enclose cheque/P.O. No. ________

for £ ________ made payable to ROMAG.

OR My Access Card No. is

Name ________

Address ________

________ Tel: ________

ROMAG CEAF

The filter which eliminates all competition

CEAF is a Registered Trade Mark.

(continued from page 55)

because of familiarity with the older version. However, I did find the cursor keys caused problems, as did the equals key which is tucked away in the bottom-right corner.

Scientists will be interested to learn that the Pi character is not merely a graphic. It actually contains the value of the famous transcendental number to computer accuracy.

When switched on the computer came up with the default colour set of blue border, white paper and black ink or foreground colour. I found this much easier to read than the blue on blue colours of the Commodore 64. However, it isn't as good as the Spectrum because peculiar lines appear on the screen. These correspond to the character positions and no amount of messing with the controls would get rid of them. I tried a second TV and they were still there.

These lines disappeared when I changed the paper colour to black and the ink colour to white or, indeed, any other bright colour. As on the 64, there are 40 columns across the width of the screen, and 25 rows. The screen characters are all nice and chunky so there is hardly any risk of eyestrain especially as the picture was rock solid steady, unlike most 64s.

On power up, and whenever the reset button is used, a message is printed telling the user that he or she is using Commodore Basic V3.5 and that there are 12,277 bytes free. This seems a large amount of free memory in a computer that only as 16K of RAM but, unlike the 64, the Basic does not overlap the RAM but resides in ROM. Located somewhere around the 32K mark — hex 8000 — the Basic V3.5 is certainly something else and transforms what might have been a fairly dull micro into a rather exciting one.

Commodore Basic V3.5 is loosely based on the versions of Basic used on the last of the Commodore Pets. It has all the commands present on the Commodore 64, which had a notoriously poor Basic, together with certain other commands which will make graphics programmers very happy indeed. If anything, Basic V3.5 is more like MSX Basic and is by far the best Basic yet implemented by Commodore.

Good machine-code monitor

Not only is there a very powerful version of Basic but also a very good machine-code monitor. Unlike the BBC, you cannot mix lines of assembler with Basic; however creating your own machine-code subroutines and adding them to your Basic programs is simplicity itself. You can even disassemble the ROM. The computer will automatically go into monitor mode whenever an error is encountered in a machine-code program but it can also be entered from Basic by using the Monitor command.

The monitor allows you to enter hex codes directly and examine disassembled listings of the ROM and RAM. It also allows you to to load and save machine code to and from tape; it even allows you to examine the 6502 registers. This is a very welcome addition to any computer but isn't as necessary as it would be on the 64 as the Basic is so good. On the 64, most users have no option but to use machine code, here it is a luxury.

Certain Basic commands are available from the function keys though I found that I hardly ever used them, preferring to type them out the old fashioned way. The only command I did use in this way, was Graphic which selects the graphic mode for the screen. There are five such modes — 0 is the default text mode, 1 is very high resolution, 2 is the same but with a text window at the bottom, 3 and 4 are a lower resolution version of one and two.

Circles drawn quickly

Graphics mode zero, the text mode, makes no claims on the available RAM. It can be used by the Print command, or by Poking the area of memory mapped on to the text screen. As with the 64, a separate area of memory holds the colour map. The other graphics modes takes huge amounts of memory leaving only 2K or so free to Basic. This makes the machine similar in capacity to the Vic-20 though the graphics are better. I expect most users will purchase add-on memory cartridges as soon as their budgets allow.

Circles can be drawn very quickly using the Circle command, something that would take over a minute using Basic on the 64. There have to be three parameters after the circle command, specifying colour, and x and y screen positions. But a number of optional parameters can be added allowing the programmer to specify the radius, eccentricity, start and stop positions — in degrees — allowing arcs to be drawn and, finally, the amount that the whole circle or ellipse should be rotated from the horizontal. A further parameter allows you to convert your circle into a polygon.

Other graphics commands include: Box which is similar to Circle; Locate which positions the graphics cursor; Draw which plots a point and Scnclr which clears the current graphics screen. Also available to graphics programmers are: Scale, Color, GShape, SShape, and Paint which is one of the neatest "fill" commands I've seen on any computer.

A lot of the commands available on the 16 will bring a smile to the face of any programmer. Trap, Tron, Troff and Errs make writing and debugging programs much easier. Hexs and Dec convert numbers for working in machine code to hexadecimal and decimal respectively. The automatic line numbering can be switched on using Auto. Teachers and other fans of structured programming can take refuge in the Do-Loop construction as well as While and Until. There is also a full complement of disc commands which were sadly lacking on the 64.

The Commodore 16 is fully compatible with the MPS-801 printer — the program listing used in this article was produced using it. It also works perfectly well with the 1541 disc unit. Though Commodore 64 software will load, it will only run on the 16 if it contains no Peeks or Pokes.

Price fixed at £140

The price of the Commodore 16 has been fixed at £140 — that includes the cassette drive, a cassette introduction to Basic and some games. This pits it directly against the Sinclair Spectrum and the now discounted Atari 600XL. In this part of the market one feature counts more than anything else — software — and how much decent software can be produced to go with an unexpanded machine is anyone's guess. I would not expect it to be great and what does arrive will only be of a moderate standard if the Vic-20 is anything to go by.

However, the cartridge software could be another story as could software for the expanded system which will be compatible with the excellent Commodore Plus 4. I expect there to be a great deal of software for the Plus 4 which should run on the 16.

The Basic is better than that of any other machine in its price range and thus it is an excellent beginner's micro. Concerned parents will flock to buy the machine to ensure their kids don't lose out on the micro boom. There are no great breakthroughs with this machine so the fainthearted can buy a 16 with the safe knowledge that it is tried and tested technology that they are getting. It also comes with a complete set of available add-ons that work with the 64. ■

Listing 1.

```
100 GRAPHIC3
110 SCNCLR
200 COLOR 1,11
210 COLOR 0,1
220 COLOR 2,5
250 FOR X=1TO180 STEP 20
300 CIRCLE 1,80,100,60,10,0,0,X
350 NEXT X
360 CIRCLE 1,80,100,70,80
400 C=INT(RND(0)*4)
450 X=INT(RND(0)*100)-50
500 Y=INT(RND(0)*2*SQR(2500-
(X*X)))+100-SQR(2500-(X*X))
510 X=X+80
550 PRINT C,X,Y,1
600 FOR I=1TO3
700 GOSUB 1000
710 FOR J=ITO0 STEP-1
720 IF C(I)=C(J) THEN GOSUB 1000
730 NEXTJ
740 COLOR I,C(I)
750 NEXT I
800 GETA$:IF A$=""THEN GOTO 400
900 GRAPHIC0
950 STOP
1000 C(I)=RND(0)*15-1:RETURN
```

The Commodore 16 has a good range of graphics commands.

CONCLUSIONS

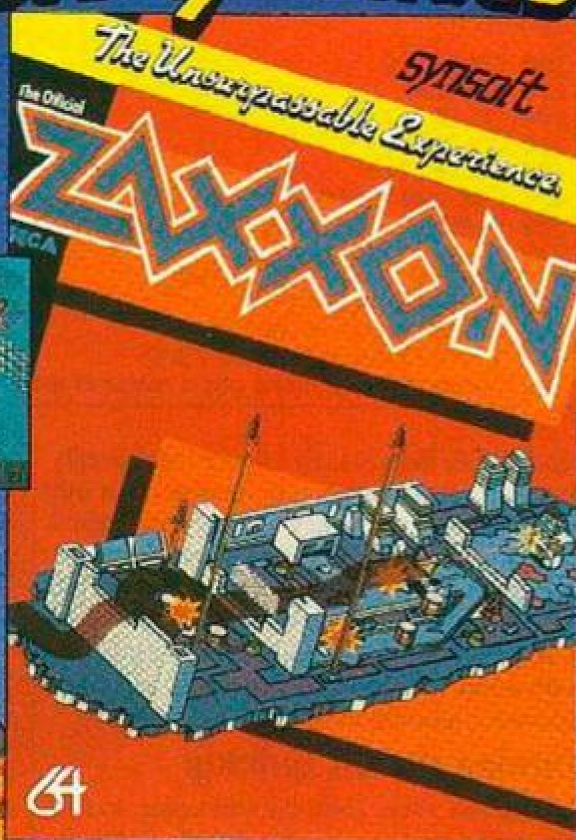
- The Commodore 16 is an excellent beginner's machine, with a very good Basic, graphics and a two-channel sound facility. It also has a good typewriter-like keyboard and will interface easily with existing disc units and printers.
- However, the small memory, 16K, is soon eaten up by the high-res screen so the micro will not be much of an arcade games machine without a memory expansion. The lack of a standard joystick port also counts against the machine as a gamester's micro.
- It is unlikely that existing Atari, Spectrum, Dragon or Commodore 64 owners would consider upgrading to a Commodore 16. But it would be a worthwhile route for a Vic-20, Aquarius or ZX-81 owner to take.

synsoft presents... The World's Greatest Games!

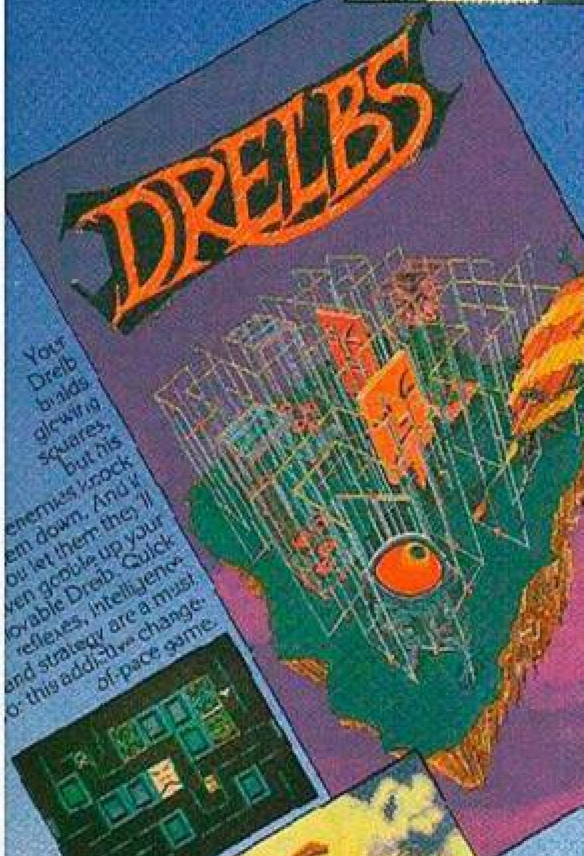
Selected Titles available soon for Spectrum



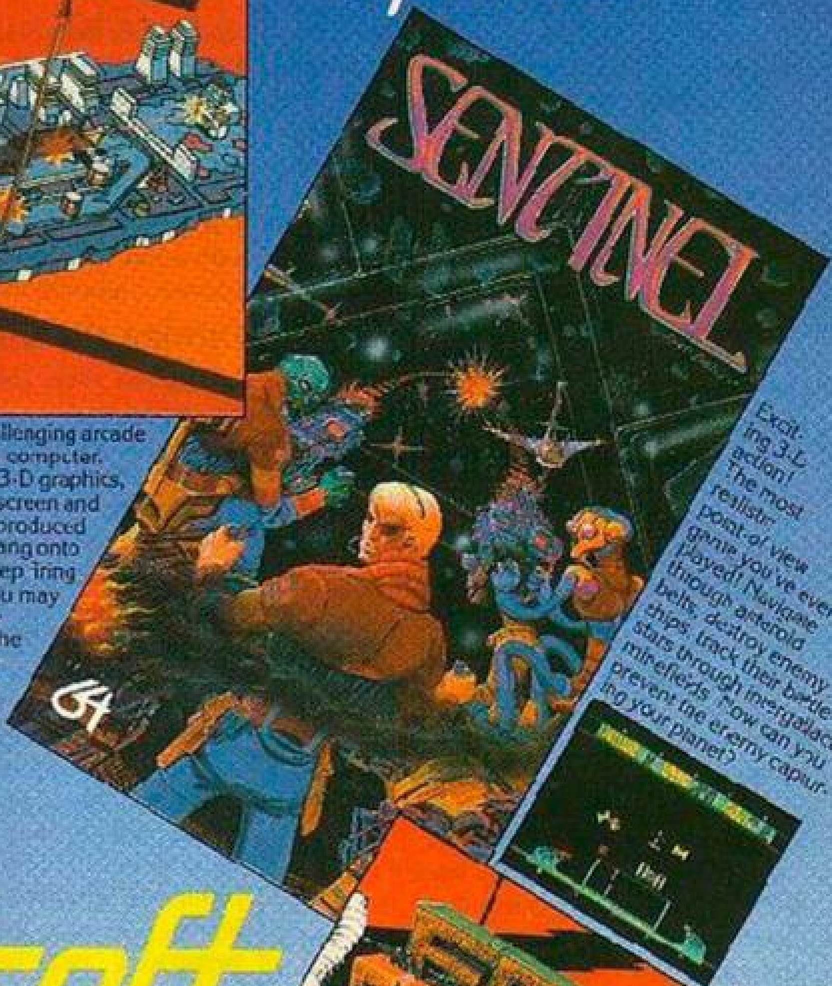




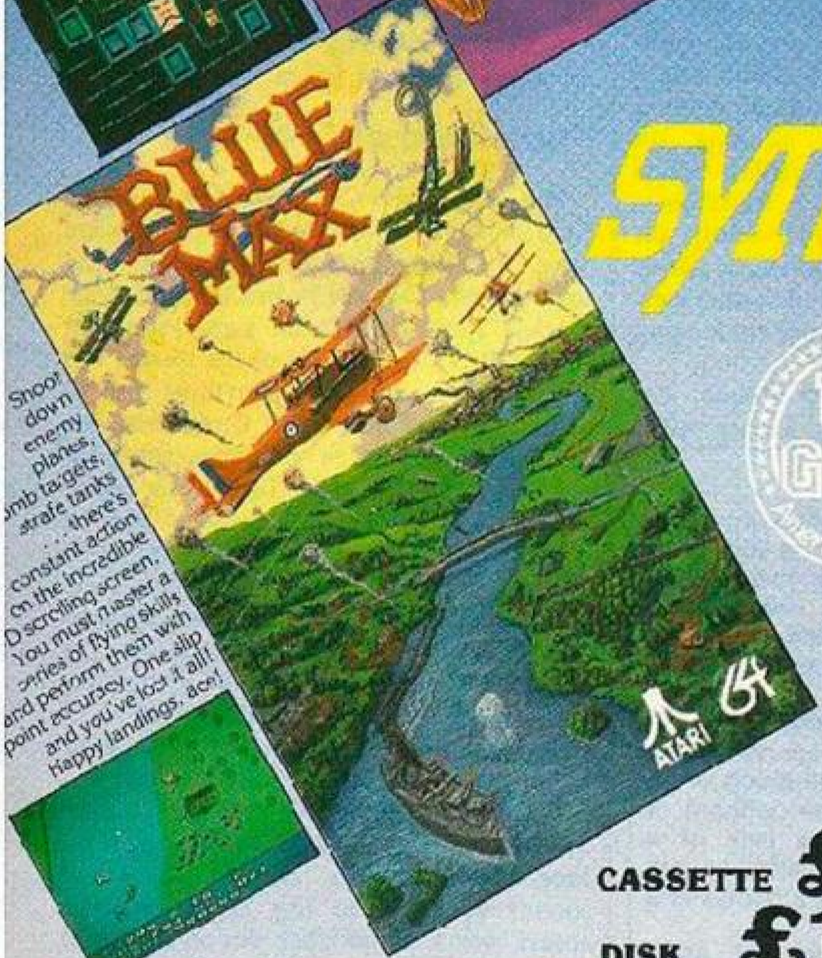
Play one of the most challenging arcade games on your C-64 computer. ZAXXON's incredible 3-D graphics, diagonally scrolling screen and super sound are reproduced in great detail. Hang onto your joystick, keep trying and practice. You may eventually encounter the deadly Zaxxon himself!



Your Drelb builds glowing squares, but his enemies knock em down. And if you let them they'll even gobble up your lovable Dreab. Quick reflexes, intelligence and strategy are a must in this addictive change-of-pace game.



Exciting 3-D action! The most realistic point-of-view game you've ever played! Navigate through asteroid belts, destroy enemy ships, track their battle-stars through intergalactic minefields. How can you prevent the enemy capturing your planet?



Shoot down enemy planes, bomb targets, strafe tanks ... there's constant action on the incredible 3-D scrolling screen. You must master a series of flying skills and perform them with pinpoint accuracy. One slip and you've lost it all! Happy landings, ace!

synsoft





Play this multi-level extravaganza three different ways. Fire on vile enemies, navigate deadly hazards, rescue 18 trapped friends, make your way through treacherous caves! Super graphics, unnerving sounds and constant scrolling screen.

CASSETTE £9.95
DISK £14.95



THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD

U.S. Gold is stocked by all leading computer stores including:



John Menzies WHSMITH WILDINGS WOOLWORTH

U.S. Gold Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH Telephone: 021-520 7591. Telex: 337268.

REVIEW

SEGA

David Aubrey Jones looks at the Sega-voted Computer of the year in Australia!

TO PEOPLE IN this country Sega is a new name in home computers, but to those who frequent video arcades it will be familiar as the originator and maker of many of the best arcade games — Buck Rogers, Zaxxon and Frogger. In fact Sega has been making computers for a considerable time now and they have been available in other English speaking countries such as Australia and New Zealand for the past 18 months. The subject of this review, the Sega SC-3000H, was voted Computer of the Year in Australia last year.

Externally the Sega 3000 appears neat and well made. It has a low profile and a full size keyboard with white alphanumeric and grey control keys. To the right of the keyboard are four cursor keys that are used for editing and which can be used in place of a joystick. Above them is an orange reset key which, if pressed accidentally during the execution of a Basic program, sensibly leaves the program still in memory.

Rubber mat behind keys

The keyboard mechanism itself functions in the same way as that of Sinclair's QL computer — resistance behind the keys is provided by a rubber mat. While not providing the quality of a proper keyboard, such as on the Amstrad or BBC computers, it is better made, more positive and less clattery than the QL's.

To the rear of the computer beneath a narrow ventilation grill is an on-off switch and sockets for power from the separate AC adaptor, cassette recorder, printer, video and television. Two industry-standard joystick ports — Atari — are found on the left side of the computer and a well recessed cartridge port on the other side. After switching on without a cartridge in situ one is greeted by a blank screen because there is no ROM inside the main body of the computer.

To program, a Basic cartridge must be used, of which several are available. It worries me that there is no safeguard against inserting a cartridge while the power is switched on. A small note hidden in the instructions informs you that this may damage both computer and cartridge. Expansion possibilities include a four-colour printer/plotter, alias the Tandy CGP-115. A 3in. compact floppy disc unit is also understood to be under development.

Much will no doubt be heard in the coming



months about the new Japanese MSX computers that should soon reach our shores in large numbers. These have been criticised as using outdated technology. The Sega microcomputer uses that same technology. It is based on a Z-80A central processing unit coupled to a Texas TMS-9929, equivalent to a TMS-9918A, video display chip. The video display processor is the principle factor that decides the graphics quality possible on a computer.

16 colours available

The Texas 9929 produces a graphics resolution of 256 by 192 pixels with 16 colours available on the screen at a time. These are white, grey, black, light green, medium green, dark green, light yellow, dark yellow, light red, medium red, dark red, magenta, cyan, light blue, dark blue and transparent. However, colour resolution is limited horizontally, but not vertically, to two unique colours per eight pixels.

This is inferior to the Amstrad CPC-464, QL or BBC where each individual pixel on the screen can be a different colour. This has the unfortunate effect that the fill — Paint — command provided in Sega Basic produces great zig-zag steps of colour when filling two adjoining areas with different colours. 32 sprite characters are supported, but these are also limited in their colour resolution.

All computers I have seen that have used the Texas chip have displayed two marked characteristics. The Sega 3000 is no exception. Firstly, most of the colours lack the

(continued on next page)

(continued from previous page)

vividness we have come to expect from the microcomputer. Secondly, on a British television the whole display is offset to the left which results in a loss of the border colour to that side. Characters displayed on the extreme left are also beyond the field of view.

Sega has dealt with this problem by getting Basic to miss the first two characters on a line, but this reduces the 40-column display to 38 columns. Unfortunately this correction has not been made in the games available. Despite my reservations about the video display processor, it must be said that on a colour television good results were obtained with scarcely any colour rippling.

Used by video display

16K RAM memory is provided internally in the Sega for use by the video display. However, this can only be accessed via the Texas display chip. This limits its use and also severely restricts the way machine-code programs can manipulate and rapidly change the display. The only other memory in the main body of the Sega itself is 2K RAM.

Three different versions of Basic were provided for review, Basic level IIa, IIIa and IIIb. These last two contain additional RAM memory for programming, 16K and 32K respectively. Since Basic IIa contains no additional RAM memory to supplement the 2K present internally only 515 bytes are free for program use. This takes us back to ZX-81 days and cannot be considered adequate even for beginners.

Basic IIIa leaves 12,284 bytes free for programming and Basic IIIb leaves a much more respectable 26,520 bytes free. This system of only providing additional RAM in the Basic cartridges must make extra memory rather expensive. An initial purchase might include Basic IIa or IIIa. If more memory was subsequently required the purchase of a new cartridge would duplicate the Basic ROM, manual etc. This is likely to be rather unpopular.

Sega Basic level III is contained in a 32K ROM. This is a fairly complete implementation based on the old Microsoft standard with no major omissions. See tables 1 and 2. However, it supports no statements that ease the task of writing structured programs. There are no procedures or Pascal looping constructs such as While-End. Even the fairly common Else addition to an If-Then statement is not included.

Table 3. Speed tests — time in seconds.

	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Mean
BBC B	0.8	3.1	6.1	8.7	9.0	13.9	21.2	49.9	14.4
Amstrad 464	1.3	3.5	9.4	9.8	10.4	19.3	30.5	34.4	14.8
CBM 64	1.2	9.3	17.6	19.5	21.0	29.5	47.5	119.3	33.1
ZX Spectrum	4.4	8.2	20.0	19.2	23.1	53.4	77.6	239.1	55.6
Sega 3000H	5.0	20.8	44.6	59.3	61.2	96.4	132.1	755.1	146.8

Full screen editing is supported and this was fast and easy to use. The arrow keys are used to move the cursor around the screen and a separate Insert/Delete key is then used to alter the program.

A number of graphics commands are available — see table 1. These include Position with which one can alter the screen origin, the point where x=0 and y=0, and a very powerful Circle command. This must rate as the best I have seen allowing the drawing of ellipses to any ratio either horizontally or vertically, incomplete circles and filled circles.

These last two features greatly simplify the drawing of pie charts, but unfortunately the colour resolution discussed earlier can be a hindrance to this end. The Color command is also powerful, in that it can be used to draw boxes of background colour at different points on the screen.

The standard character set is unusual in containing a large number of foreign language characters and these are available direct from the keyboard, as are a number of graphics characters. These and others can all be redefined — character codes 32-255 — to create one's own graphics characters. In addition, up to 256 sprite characters can be created, with the restriction that only 32 can be used on-screen at once.

Sprites are positioned on the screen by defining the top left-hand corner of the sprite pattern by the Sprite statement, and they may be moved pixel by pixel by redefining the sprite origin. This provides a simple but powerful method of smooth movement. In addition, sprites may be magnified and four characters may be used in tandem to form a single sprite.

CONCLUSIONS

- The Sega 3000 uses a Z 80A CPU and a Texas video display chip, similar technology to the MSX computers.
- No ROM is present internally in the main body of the computer and there is very little memory for programming. Basic is contained on plug-in cartridges. Some of these contain additional RAM memory which is not available separately.
- The implementation of Basic is extremely slow and contains no statements to aid the writing of structured programs.
- Some of the cartridge games are excellent and live up to the Sega name. However, none of these is available on the cheap medium of cassette.
- The price has yet to be finalised but unless this is below £100 Sega will find it very difficult to compete in the crowded market in this country.

Disappointing sound

However, the sprite possibilities provided by the Texas video chip have not been utilised to the full in Sega Basic. Collision detection has been omitted and the opportunity has not been taken to provide automatic interrupt control of sprite movement such as is found on the Memotech MTX-500.

The sound facilities provided are also somewhat disappointing. With one noise and three tone channels output through the television loudspeaker, no attempt has been made to give any form of envelope control. Only frequency and volume can be set.

Perhaps the worst thing about Sega Basic is that it is unbelieveably slow — see table 3. This coupled with a fairly poor manual, obviously badly translated from the Japanese, means that it is not well suited to anyone wishing to do much programming. Although access to machine code is possible no information or help is given in this direction and it is suggested "You could learn the machine language at some other opportune time".

Excellent games

A large number of games cartridges were provided for the review and some are excellent. There is a good version of Sega's arcade game Exerion which can be seen at various motorway service stations round the country. This features a very good 3D moving landscape with mountains and clouds rolling in the background. Another first-rate game is Star Jacker, a very addictive Deathstar-type game. However, none of the games are at present available on cassette. They must therefore prove expensive compared with the cheap cassette-based games available for other home computers.

In the video arcade game market one of the main rivals to Sega is undoubtedly Atari, and this is also likely to be the case in home computers. However, in this area Atari are already well established and with the price of the Atari 600XL already down below £100 the Sega 3000 will have to be priced very low. ■

Table 1. Sega Basic level III — statements and commands.

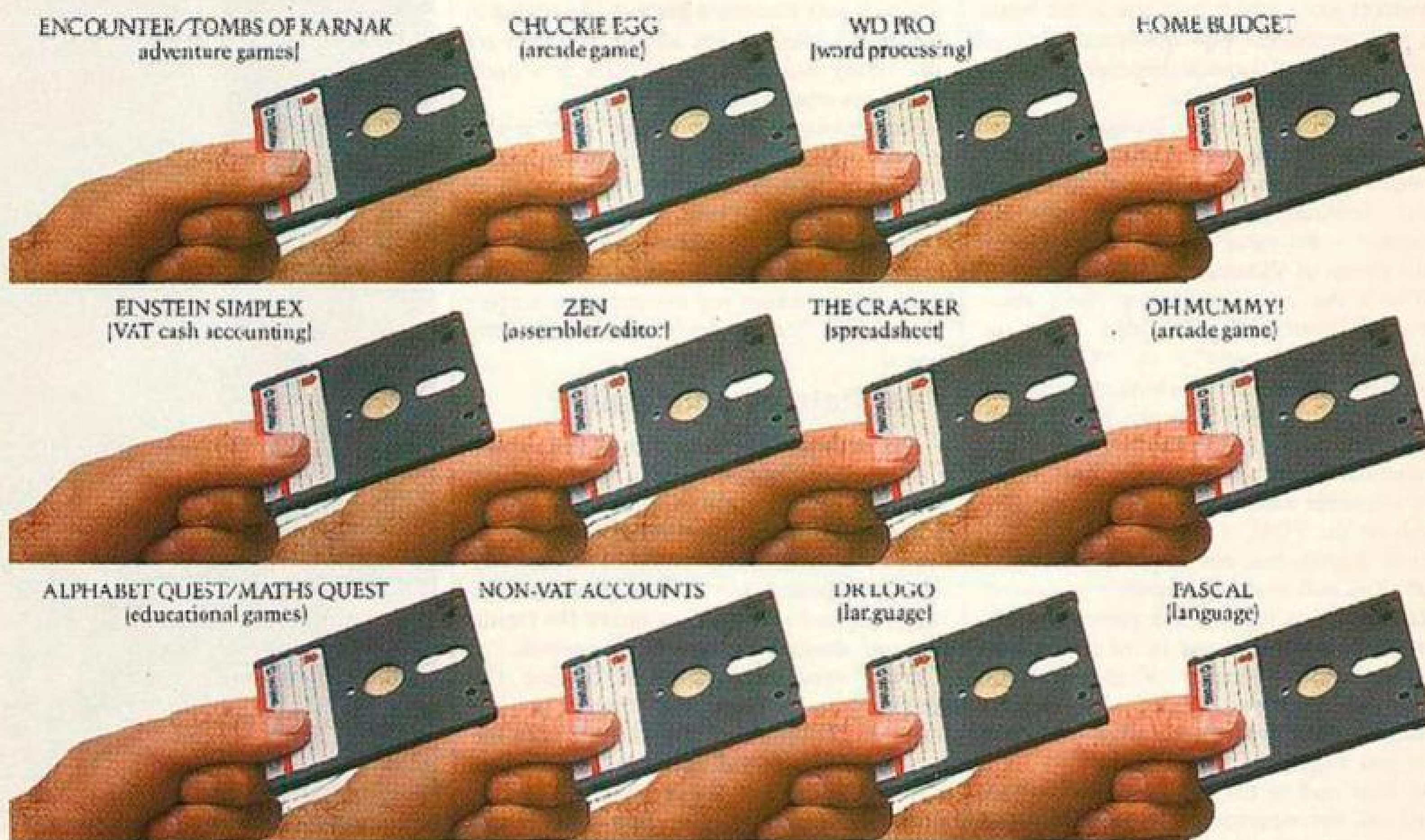
AUTO	BCIRCLE	BEEP	BLINE	CALL	CIRCLE
CLS	COLOR	CONSOLE	CONT	CURSOR	DATA
DEF FN	DELETE	DIM	END	ERASE	FOR-TO-STEP
FRE	GOSUB	GOTO	HCOPY	IF-THEN	INPUT
LET	LINE	LIST	LLIST	LOAD	LPRINT
MAG	NEW	NEXT	ON-GOSUB	ON-GOTO	OUT
PAINT	PATTERN	POKE	POSITION	PRESET	PRINT
PSET	READ	REM	RENUM	RESTORE	RETURN
RUN	SAVE	SCREEN	SOUND	SPRITE	STOP
VERIFY	VPOKE				

Table 2 Sega Basic level III — Functions.

ABS	ACS	ASC	ASN	ATN	CHR$	COS	DEG
EXP	HEX$	INKEY$	INP	INT	LEFT$	LEN	LGT
LOG	LTW	MID$	PEEK	PI	RAD	RIGHT$	RND
SGN	SIN	SPC	SQR	STICK	STRIG	STR$	TAB
TAN	TIME$	VAL					



ALL HANDS ON DISK. NOW.



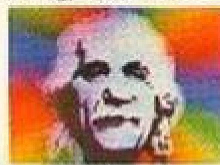
Einstein from TATUNG. Sheer genius from around £499. The complete colour micro with no hidden extras. And with no hidden software, unlike some other new computers.

Right now you can get your hands on both Einsoft and Einsoft Approved Software. An immediately available range that's every bit as versatile as Einstein itself. "Einsoft" is our own software, designed and prepared for Einstein by TATUNG.



Kuma, Crystal Research, Digital Research and Solo are some of the country's leading software houses now writing superb software packages for Einstein, and TATUNG has complete confidence in recommending those packages which bear the "Einsoft Approved" seal.

So from today you can explore the genius of Einstein with software covering a tremendous range of applications. From word processing, database and home economics to education, languages and games. And there's plenty more coming all the time.



Einstein from TATUNG. Sheer genius at home. At work. At school. And now at your local stockist.

TATUNG
Einsoft

DIAL 100 AND ASK FOR FREEFONE EINSTEIN FOR YOUR NEAREST STOCKIST.

SPECTRUM SOFTWARE

THE SUN STREAMS in through the two broad windows in your sitting room. There is a pipe rack to the right of the sofa. Bullet pock-marks are the feature of one wall and charts and diagrams fill another. An acid-stained table sits in the corner. You can see an oil lamp, your armchair and Watson's armchair. He is carrying the Daily Chronicle. Watson looks up from his paper and says "Good Morning Holmes".

Yes, here we are, right in the thick of it with Melbourne House's innovatory new adventure game which puts you in the boots, not to mention the pipe and deerstalker, of Britain's greatest fictional detective as created by Sir Arthur Conan Doyle.

Using Inglish — not the Newspeak English as espoused by the Ingsoc Party in George Orwell's 1984, but an 800 word vocabulary which facilitates communication with the computer — the game allows you to roam the gaslit streets of Victorian England.

What's the most infuriating thing about adventure games? The fact that when you type in "Get paper", or "Get Daily Chronicle" the stupid machine types out "I see no paper (or Daily Chronicle)" in direct contravention of the description it has just printed out higher up the screen. This is why a lot of people waste time typing out naughty words on the VDU.

Even Inglish has not improved this situation. You still basically require a crossword-puzzle mentality to solve text games. But this is just a personal beef and in no way reflects on the excellent quality of this program which, apart from Inglish, also features Animtalk. Now you tell the other characters what you would like them to do.

Be brief and to the point or else they get bored and uncooperative. The game is played out in real time which means that things continue to happen as time goes on. So if it gets dark, and you haven't got a trusty oil lamp with you, you will be in pitch-blackness.

Program	Company	Price
Sherlock	Melbourne House	£14.95
Strangeloop	Virgin Games	To be announced
Sabre Wulf	Ultimate Play The Game	£9.95
Factory Breakout	Poppysoft	£5.50
Kosmic Kanga	Micromania	£5.95
Moonsweeper	Cheetahsoft	£7.95
Delta Wing	Creative Sparks	£6.95
Combat Lynx	Durell	£7.95

Written by Philip Mitchell, of "Hobbit" fame, the program is the result of 15 months work and features some excellent graphics. Having taken a long time to write, it naturally takes a long time to play — but an average completion time is supposed to be "several months".

A different sort of adventure game has been in evidence recently — the arcade adventure. Perhaps the best-known example of this phenomenon on the Sinclair ZX Spectrum is Ultimate Play The Game's Atic Atac. If an ordinary text adventure game is like sitting in the back garden, arcade adventure games are like trying to do the Cresta Run in a deck-chair: not exactly relaxing.

Strangeloop is Virgin Games' stab at this market. Noised abroad as a "massive arcade adventure with a wealth of graphics", it certainly is very prettily drawn and has the essential capacity to allow redefining of the control keys. Whereas Atic Atac gives an overhead view of where you are and what horrors beset you, Strangeloop's view is strictly lateral.

The state of your suit

The bottom right-hand side of the screen gives you a schematic view of where you are including entrances and exits on a 5 by 5 grid. You are also shown the state of your suit — not a natty threepiece pinstripe, I daresay you will have guessed, but the sort guaranteed to keep body and soul together amidst the raging fires and desolate vastness of the cosmos.

You'll need your spacesuit because the conditions in the robot factory which you are trying to get control of would make even the most blasé Health and Safety Inspector's hair stand on end. What with soaring temperatures, no oxygen, zero gravity and razor sharp industrial waste, this place makes even the *Your Computer* office appear suitable for human habitation. No wonder the robots are tetchy.

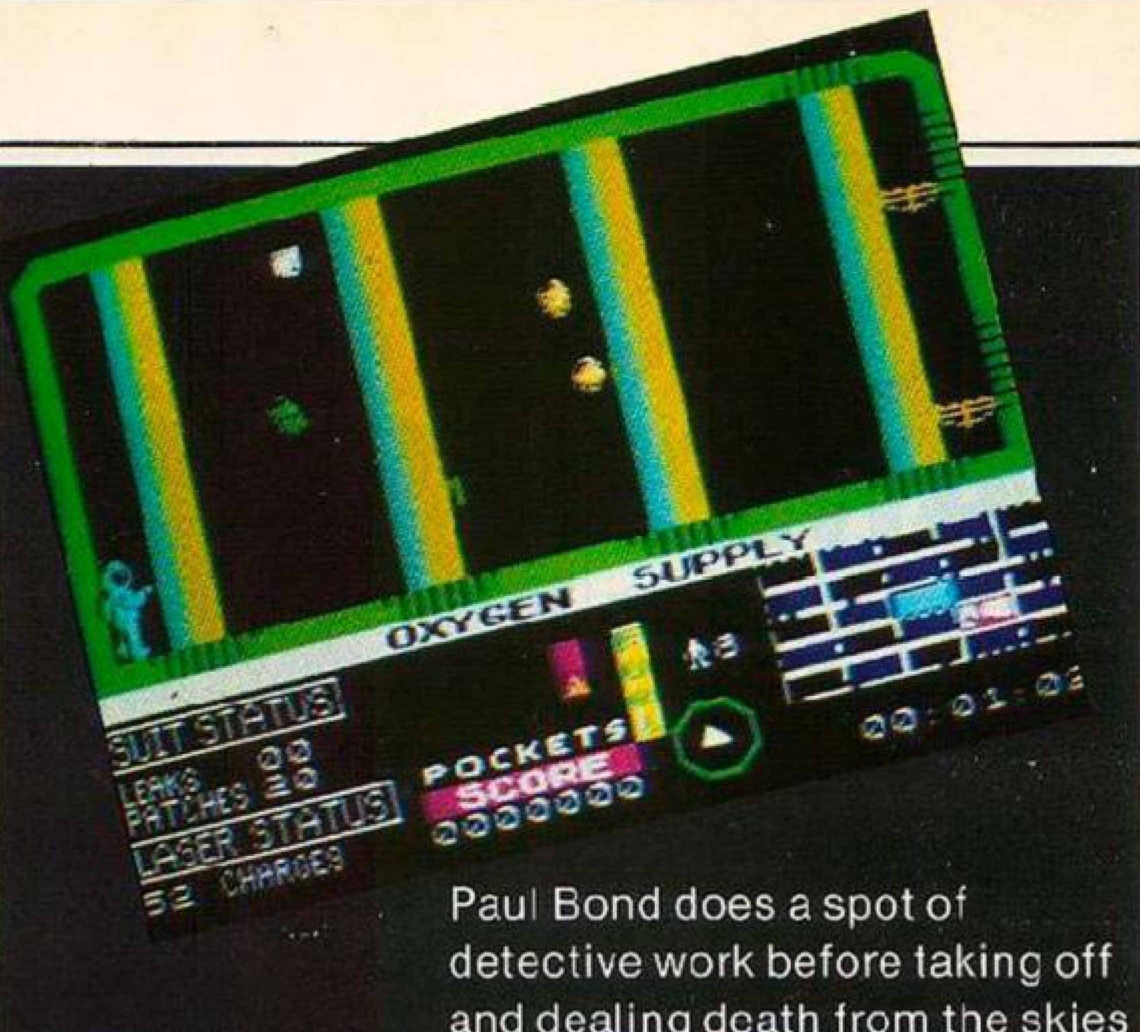
As usual, there is no map to help you since it is over 100 years since the last human was given his cards. There are 240 rooms between you and the Control Centre, so you had better sharpen up your pencil and your cartographic skills double-quick. It goes without saying that you have a laser gun and earth is doomed if you don't get your act together. So it goes. The game has a facility enabling it to be Saved, so that you can go back to playing it at the exact point you left off.

Needless to say, the people who brought you Atic Atac aren't resting on their bank statements. Ultimate Play The Game now bring you Sabre Wulf. Glinting eyes, clutching hands, clasping claws — no, not a computer fair but a mounded clearing with a warning etched into the lifeless stone. Basically this is Atic Atac in the jungle; same overhead view concept with lots of pretty vegetation — the graphics are excellent — and hazards ranging from rampant rhinoceros to sleeping hippopotamus.

Orchids are an unusual feature of this game. They bloom rather suddenly and if you run into a Blue Super High Energy Orchid, this is fine because you zap around like a skate-boarder with no brakes: on the other hand Purple De-orientation Orchids and Yellow Sickness Orchids are bad news. Your explorer automatically picks up any useful objects by passing over them and will wave his sword around realistically when you hit the T key. Maze freaks everywhere will love this one.







Paul Bond does a spot of detective work before taking off and dealing death from the skies



Factory Breakout has nine levels and is the follow-up to Poppysoft's Laser Snaker which has/had a prize riding on the outcome. Factory Breakout starts with you inside a revolving egg-capsule, fending off encroaching death rays. Then you metamorphose into an animated dustbin dodging along a conveyor belt defended by lasers, then you end up in a Pac-Manesque maze being assaulted by boorish blobs.

Laser Snaker and Factory Breakout are less stylish than the true arcade adventure games we have just been looking at but no less enjoyable for all that. These are really layered shoot-em-ups; the distinction is that in an adventure game, arcade or otherwise you have to acquire certain objects to enable you to complete your quest. Factory Breakout is guaranteed to keep you on the hop.

Also keeping you on the hop is Kosmic Kanga. Simple stuff this, you score points for picking things up provided they aren't bombs or anything silly like that but when it gets down to it, a little foray into Minter country from Dominic Wood at Micromania. The graphics are well-executed, so much so that at first I thought it was another wacky offering from Paco and Paco, the Spanish duo who brought you Bugaboo.

The space-happy marsupial, having made a giant leap for kangaroo-kind, has lost his spaceship. Too much of the old Fosters maybe. So he bounces across the airport — mind planes and bombs; the desert — mind birds and skulls; The Ocean — mind octopus and jellyfish. Get the picture?

Spate of corridor games

Brought from America to the UK by Cheetahsoft is Imagic's Moonsweeper. It has some similarities to the spate of corridor games we saw recently for the Commodore 64.

The first screen has you under attack by all and sundry, every so often a moon shows up — if you can land on this it is your turn to dole out the punishment while you try and pick up six pioneers. Once achieved, you then navigate through the accelerator rings to zap up enough Gs for take-off. Then you can go and roust the natives somewhere else.

A more thoughtful approach to dealing death from the skies is evident in Creative Sparks' new offering, Delta Wing. A real knee-trembler this, not least because the screen shows you the pilot's knees and his hand clasping the joystick. The hand moves the joystick up and down as you touch the controls, and the poor chap's knees twitch as the hostile aircraft zooms by peppering the Perspex with bullet-holes.

The program doesn't pretend to have the kind of realism and sophistication of Digital Integration's Fighter Pilot — for example, it's not clear what sort of aircraft you're flying. The screen loading graphic shows a kind of hybrid between the F-5 and the old Delta Dagger. Nevertheless, there is plenty to get your teeth into.

To take off, you must taxi until your airspeed is over 33 knots — full flaps — or 87 knots — no flaps. Once airborne you call up a map to find out where the enemy bases are. The objective is to destroy them and protect your own bases from enemy aircraft. There are 14 controls to keep your eye on plus extra data given when you look at the map. Your chance to find out if you've got the right stuff.

Durell have, in the meantime, gone over to egghesters. Not catering programs you'll be glad to hear but Lynx helicopters.

Digital Integration have a gunship simulation on the pad, but hit some problems with the name. Provisionally titled Thunderbird, it will now probably be called Tomahawk. However, it looks like Durell may pip them at the post with Combat Lynx, written by Mike Richardson of Harrier Attack and Scuba Diver fame with technical support from Westland Helicopters.

In the prototype program that I looked at, the screen presents you with a forward view of the battlefield showing the helicopter on the pad. Around the view panel is encrusted the usual height, temperature, speed, fuel, weapon and navigation information. Press key 7 and the copter takes off — on the preview version landing or hitting hills caused the program to crash — and when you head NE the helicopter graphic changes to a three-quarter view.

The game is designed so you can fly forward in the four main directions of N, S, E and W. You can veer away from these main directions by up to 45 degrees. Any more and the screen blacks out while a new forward direction is selected, at which point the helicopter appears seen from the opposite three-quarter view.

I found this a little disconcerting, but what is evident is that the memory-mapping techniques developed so far make this game significantly different to other battlefield shoot-em-ups. ■

COMMODORE GAMES

SOFTWARE REVIEWS used to start off by complaining that too many games were arcade derivatives. Nowadays games draw their inspiration nearer to home. A high proportion of all the new software seems to be based on Manic Miner and its descendants. Manic Miner could only have been created for home computers: there is no way you could play it in an arcade for the simple reason that it takes too long to master.

This month's Manic Miner look-alike is Blagger from Alligata Software. Blagger reproduces most of the original features quite unashamedly, including crumbling platforms, conveyor belts and dangerous plants. It even draws on Manic Miner's cast of hostile objects — flying telephones and chomping teeth.

You start off in a bank. Once you have picked up the golden keys you move to a sweet factory, thence to the evil dentist's surgery and so on until you have completed all 30 screens.

The appeal of games of this sort lies in working out the exact sequence of moves, in discovering by trial and error just where to jump and in what order to pick up objects. For some reason this activity is highly addictive. The more you blunder the more determined you become to complete a room.

In this respect Blagger is possibly even more maddening, and therefore more engrossing, than Manic Miner.

Son of Blagger

If it does not finally slake your thirst for tortuousness, you can try its sequel, Son of Blagger. Here the screen gives a cut-away view of a multi-tiered building, the National Security HQ. While you play in one room at a time the screen window scrolls in all directions to give tantalising glimpses of adjacent compartments. Again, the action is fiendishly difficult.

Far more original than either of the Blaggers is Microgren's Automania. As grease monkey Wally Weeks your job is to build a car. To do this involves collecting six parts from the store room and taking them to a platform in the assembly area. Naturally, there are numerous obstacles: rotating fans drift down from the ceiling and tyres roll along the floor; while the parts can only be reached by jumping across moving gang-planks which are strewn with dangerous objects such as kettles and fire extinguishers.

The blurbs in cassette inlays tend to be rather long-winded these days, but Automania's comes straight to the point: "OK Wally try and get it right this time". Anyone who has tried their hand at home mechanics will experience a familiar sense of frustration with this game. But the satisfaction in seeing a car take shape is immense.





What marks out Automania as a rattling good game is the quality and variety of its graphics. In all there are 10 different cars to be built — the first appears to be a 2CV. Once one has been assembled a new set of parts and obstacles appears. Fans are succeeded by camshafts, pistons, compressors and such-like all of them cleverly animated.

By contrast the graphics in Mystic Mansion, a US Gold import, are dismally crude. This is yet another game where you have to pass from room to room collecting treasures. Each room is shown in plan outline and poses a simple puzzle. You may have to negotiate a maze and shoot a single alien. Or there may be a few flying objects to avoid. Other rooms require you to change shape before you can crack the puzzle.

By British game standards the mansion in question is poorly furnished. Its graphics are unimaginative and the tasks are uninspiring.

A better showing

Another US Gold import, Flak, makes a better showing for the American side. Flak is what you have to avoid as you fly an AGX hypersonic fighter in a mission to destroy Computer Control, a renegade CPU. Below you are arrays of flak batteries whose doors open to release a murderous cross-fire.

On the way to the CPU 24 screens scroll beneath you. The landscape is probably the game's best feature. Suitably futuristic it is

Blagger	Alligata Software	Tape—£ 7.95 Disc—£11.95
Son of Blagger	Alligata Software	Tape—£ 7.95 Disc—£11.95
Loco	Alligata Software	Tape—£ 7.95 Disc—£11.95
Mystic Mansion	US Gold	Tape—£ 8.95
Flak	US Gold	Disc—£14.95
Automania	Microgen	Tape—£ 7.95
Ankh	Beyond Software	Tape—£ 8.95
Decathlon	Activision	Tape—£ 9.99
Daley Thompson's Decathlon	Ocean	Tape—£ 7.90
Percy the Potty Pigeon	Gremling Graphics	Tape—£ 7.95
Alice in Videoland	Audiogenic	Disc—£12.95
Falcon Patrol II	Virgin Games	Tape—£ 7.95

Simon Beesley discovers Manic Miner clones on his way to developing the physique of Charles Atlas.

neatly layed out with lawns, paths, forests, stretches of water, and sinister metallic silos.

In other respects the game — while highly playable — lacks variety. You have the option of dodging the flak or bombing the batteries but there are no oncoming fighters to engage with.

It is a pity also that the fighter does not leave a moving shadow on the ground. The introduction of the shadow has been a major step forward in the direction of graphics realism. Consider what Blue Max or International Soccer would be like without their shadows.

Activision's Decathlon does not deploy shadow techniques either but the graphics are nonetheless superb. Competing against the computer or another player you have to control an athlete on screen through the 10 events of the decathlon.

The first event, the 100 metres, shows the quality of the animation. As you move your joystick furiously from side to side your man's arms and legs pump away smoothly and realistically.

This game calls for more physical involvement than any other on the market. The faster you waggle the joystick the better your athlete performs. So by the time you have completed the final event, the 1500 metres, you find yourself dripping with sweat and drooping with exhaustion.

Ocean's version of the same game, Daley Thompson's Decathlon, is not as well animated. The figures are squat and move more jerkily. On the plus side there are some cute touches, like the official who comes out to measure your long jump, and some pleasing sound effects. Turn in an exceptionally good performance and you are rewarded with a fanfare and the roar of the crowd.

But be warned that both games take their toll — not just on the joystick but on wrists, arms, and shoulders as well. Regular bouts of playing Decathlon would probably give games addicts the sort of physique that healthier types acquire on the beach or playing football.

A cerebral game

Ankh from Beyond Software is as cerebral as Decathlon is physical. Although it shares elements with both arcade and adventure games it is really a novelty that defies categories.

Put simply it involves exploring 64 rooms and gathering objects. Some objects are moving around and can be picked up for later use by extending feelers. Others are behind closed doors; discovering how to unlock them is part of the puzzle.

But this description does not do justice to the originality of the game. It is full of baffling features from strange sound effects which may or may not provide clues to mysterious shapes whose purpose needs to be fathomed out. Suffice to say that the game has a highly distinctive flavour and that solving its puzzles requires an unusual mix of logic and ingenuity.

Toni Crowther, the author of Blagger and Son, is clearly a prolific programmer. He has also written Loco and Percy the Potty Pigeon. Both games are distinguished by the charm of their graphics.

Loco lets you steer a classic steam locomotive along a six track railway. At the bottom of the screen is a scanner which indicates where you are in the network and what lies ahead.

Danger arrives in the form of planes overhead or explosive carts further up the line. You can either change tracks or destroy these hazards by releasing steam and smoke.

Your train chugs past a changing landscape to the accompaniment of a catchy Jean Michel Jarre tune. The game may have only a limited playing interest but its appeal is considerable, especially to those who still mourn the passing of the steam engine.

In Potty Pigeon the idea is to fly Percy along a crowded road picking up enough twigs to build a nest. In self-defence the bird can release pellets which have a corrosive effect on traffic, cats, and other birds alike. Again the appeal here is as much in the distinctive graphics — including a background of hills, forests, roadshide shops, and a castle — as in the action itself.

Intelligent helicopters, flak batteries, and radar jammers are some of the new features that greatly enhance Falcon Patrol II, Virgin's sequel to its best-selling desert fighter game FP I. In this version the landscape looks even more realistic — with a bombed-out city that would strongly suggest Beirut were it not for the presence of Pyramids.

A strange aspect of CBM-64 graphics is that they often look less impressive than those on the Spectrum — despite the fact that the CBM-64 has a higher pixel and colour resolution. Much of the blame can be layed at the door of sprites which usually give characters a chunky look.

This is particularly striking in Audiogenic's Alice in Videoland. While the background pictures are excellent the sprite-based figure of Alice is crudely drawn.

The game itself is something of an oddball. Essentially it consists of four different games loosely connected by the theme of Alice in Wonderland. Each is loaded separately from disc, and this being a Commodore disc drive there is a longish delay between them.

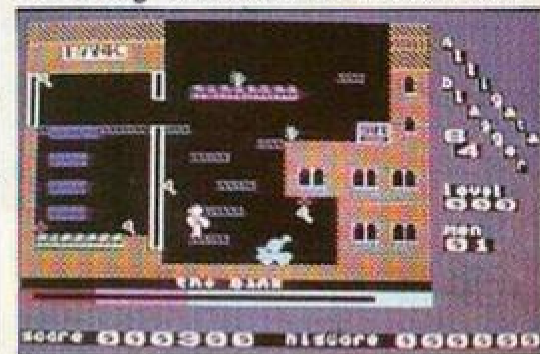
Falling down a warren

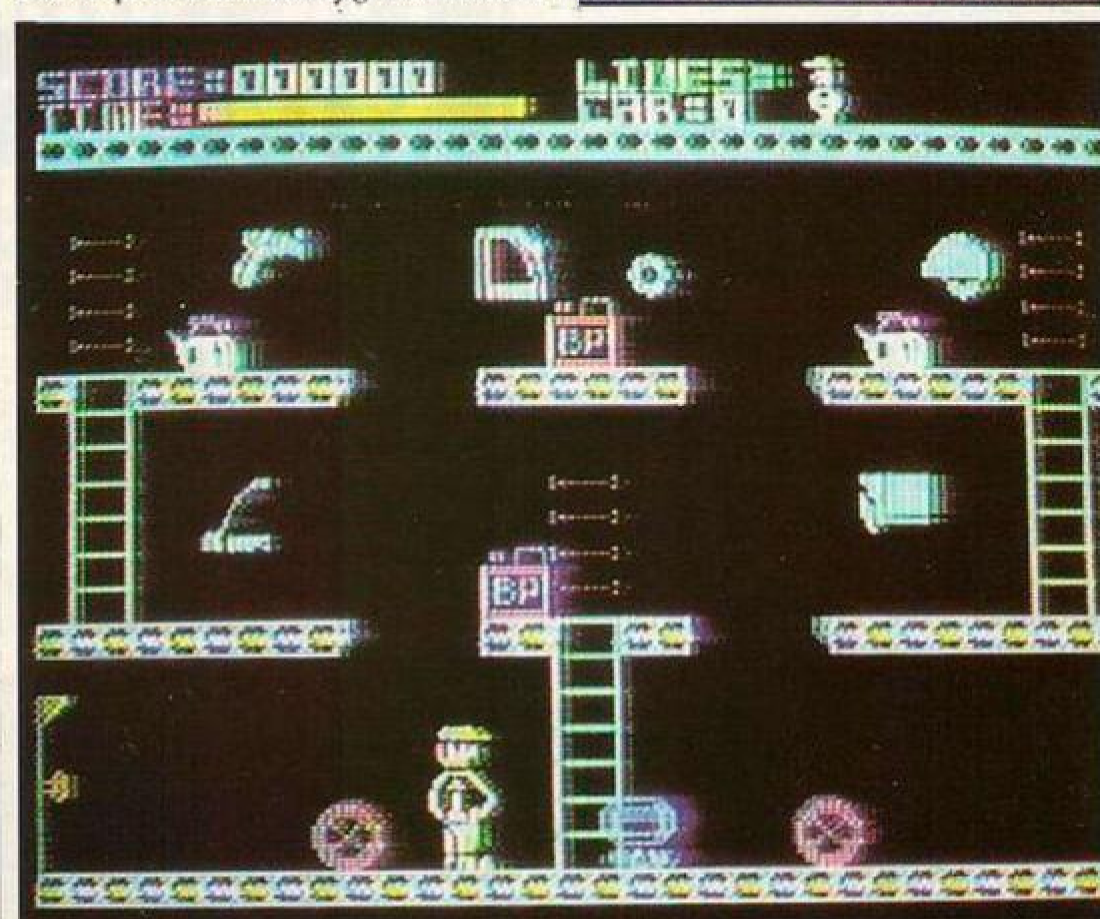
We start off with Alice falling down a rabbit warren. As she falls your task is to catch the keys, cakes and bottles that are floating by. Later these items can be used to change her size, enabling her to escape through a door.

Scene Two stars the Cheshire Cat and the Caterpillar in a garden full of exotic foliage. Here Alice must snare butterflies and rocking-horse flies while avoiding spitting flowers.

The final scenes involve a simplified chess game — white knights in combat with Tweedledum, Tweedledee and the Jabberwocky — and a croquet match against the Queen of Hearts.

Each of these episodes is entertaining enough and you are jollied along by a tremendous soundtrack. But the trouble is that together they do not add up to much. Playing the game is like listening to a long joke and wondering when the punchline will arrive. As one scene followed another I found myself murmuring "curiouser and curiouser . . .".





THE UNIQUE MSX SYSTEM

Complete

In the confused world of computer technology the unique MSX System has been adopted as a common standard for computer production by at least 16 of the biggest and best names in home electronics. This major breakthrough in the development of

The Sensational SONY HIT BIT

SONY

A 64K MSX Computer with an exclusive, built-in Personal Data Bank (firmware). This handy facility enables you to enter, store, recall and up-date all kinds of personal information such as appointments, addresses, telephone numbers, etc. Operation is simple, with instructions appearing on the screen every step of the process **£299.95**

AVAILABLE END OCTOBER



Data from the Personal Data Bank can be saved on any data storage facility or on the **UNIQUE HBI55 RAM CARTRIDGE,** available for **£39.95**

KV1430 14" MONITOR STYLE, PUSH BUTTON CONTROL TRINITRON COLOUR TELEVISION with front mounted RF terminal **£239.95**

HBD50 MICRO FLOPPY-DISK UNIT stores up to 500K bytes of information on a 3½" disk. Easily connected to the Hit Bit by using one of the MSX slots. **£349.95**

The Superb SANYO MPC 100



This sophisticated piece of equipment offers all the advantages of 64K MSX computing. *(complete with 4 programme starter pack)* **£299.95**

Plus a unique optional feature – **MLT001 LIGHT PEN.** This provides you with unlimited flair and flexibility in colour graphics design. This feature comes complete with a software package containing some intriguing graphic facilities.

CBP3000 14" MONITOR STYLE COLOUR TELEVISION with removable smoked glass screen for higher definition. **£199.95**

MLT001 LIGHT PEN £89.95



AVAILABLE END OCTOBER

RING TELEDATA 01-200 0200 FOR DETAILS OF YOUR NEAREST STOCKIST.

PRICES SHOWN INCLUDE VAT AND ARE CORRECT AT TIME OF GOING TO PRESS. E & O.E.

compatibility...

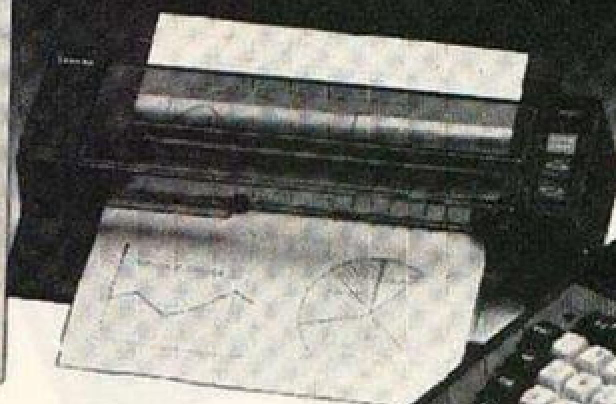
Home Computing brings you complete compatibility in hardware and software. To cater for all home computing needs, Axis have selected in these pages an unbeatable, top value-for-money range of MSX computers, colour monitors, peripherals and software for you to choose from. "We believe that when you discover the benefits of MSX computing no other system will do"

TOSHIBA

The Star Value TOSHIBA HX10

The first MSX computer to be introduced into the U.K.







AVAILABLE END SEPTEMBER

Offering superb facilities and outstanding value for the first time user or enthusiast. 64K Ram, 16 colour graphics, RF, video and audio connectors, plus ports for printer, disk drive and data recorder. *(Including starter pack software).* **£279.95**

140E MONITOR STYLE COLOUR TELEVISION
The perfect partner for the HX10, providing excellent picture and sound quality. **£189.95**

HX-P750 PLOTTER PRINTER
Easily connected to the HX10 through the printer interface. This printer features image and character plotting in 4 colours – red, green, blue and black – making it ideal for colourful graphs, pie and bar charts. Plotting speed is 285 steps per second.
£249.00

SANYO





DR202 DATA RECORDER
Top of the range machine offering a host of high technology features. **£44.95**

DON'T FORGET TO ASK YOUR DEALER FOR DETAILS OF CREDIT FACILITIES, EXTENDED GUARANTEES, ETC. AVAILABLE ON CERTAIN ITEMS.

AXIS
AT HOME WITH TECHNOLOGY

versatility

drives, light pens, plotters, joysticks, data recorders and RAM cartridges from many top name manufacturers in the home electronics field.

Their performance offers you unrivalled graphic and sound quality together with outstanding simplicity of use.

THE INCREDIBLE FISHER CFB 1410 P MONITOR STYLE COLOUR TELEVISION



This superb, high technology 14" monitor style television has earned a high quality reputation as a reference in the field of home computer monitoring. It features a full 17 function infra red remote control housed in the front of the set. Other sophisticated facilities include direct audio/visual terminals in/out and smoked glass filter for perfect picture definition.



FISHER £269.95



SANYO DR201 DATA RECORDER

An AC only recorder stylec for computer use with all controls conveniently placed on top of the machine for ease of use. **£34.95**



SANYO DR101 RECORDER

Specifically designed for use with personal computers, with phase shift switch, speaker monitor and AC/DC operation. **£34.95**

SONY TCM737 DATA RECORDER

A mains or battery operated recorder ideal for use with your home computer. **£39.95**

JVC HC-R105 DATA RECORDER

The stylishly designed HC-R105 data recorder is an example of a machine produced to offer superb user convenience, exceptional performance parameters and reliable data transfer. The HC-R105 is a high speed machine giving very short access times to data. **£89.95**



JVC

SOFTWARE



TOSHIBA SOFTWARE STARTER PACK As a special introduction to your MSX computing, Toshiba offer a pack of 5 exciting computer games for **ONLY £30**

Pack consists of: ● 3D Golf ● Trick Boy ● Clapton II ● Pyramid ● Polar Star

(Offer only available while stocks last)

Individual games available at **£7.95 each**

SONY ROM CARTRIDGE SOFTWARE A range of sophisticated Sony Rom Cartridge Software is available at prices up to **£19.95**

KNIGHTS:

KNIGHT-OTHELLO £5.95
The classic game now on MSX.

VICIOUS VIPER £5.95
Eat the men but don't bite your tail.

EXPLODING ATOMS £5.95
A strategy game for two players.

SMASH OUT £5.95
With key or joystick control.

CAVE ADVENTURE £5.95
Negotiate the labyrinth of treasures.

MSX DEMONSTRATOR £5.95
Realize the potential of your MSX.

MSX GRAPHICS £5.95
Demonstrate your excellent MSX graphics.

TYPING TUTOR £5.95
Score by response to flashing keys.

JUNIOR MATHS £5.95
Teaches children to add and multiply.

MSX BASIC TUTORIAL PART 1 £5.95
Learn MSX Basic programming.

MACHINE CODE LANGUAGE £5.95
Write your own machine code programs.

KNIGHTS MAIL LIST £14.95
Store addresses and print labels.

BUDGET ACCOUNTS £14.95
Accounts with special forecast feature. (Available on disk or cassette).

ERIC & THE FLOATERS £5.95
Recover treasure from the evil floaters.

DOG FIGHTER £6.95
Blast enemy aircraft out of the skies.

HYPERVIPER £7.95
Avoid venomous vipers in the labyrinth.

SPOOKS AND LADDERS £6.95
Trap spooks in holes & escape the mire.

COCO IN THE CASTLE £6.95
Rescue the maiden from the king's castle.

CRIBBAGE £5.95
Play 6 card cribbage with your MSX.

HOLDFAST £5.95
A local politics strategy game.

HOME BUDGET £14.95
Control your home income and expenses.

WDPRO:– Wordprocessor £29.95
A professional quality wordprocessor

DATABASE £19.95
A professional database program.

ZEN MACHINE CODE PROGRAMMING SYSTEM £19.95
Generate Z80 assembler language programs.

KUMA FORTH £39.95
A fully structured self extending language.

COMMUNICATIONS WITH VIEWDATA £19.95
Communicate through your modem.

SPEECH SYNTHESIS £69.50
(includes hardware card)
Typed in words can be spoken.

KUMA:

DRILLER TANKS £8.95
Fight in tunnels fire breath Hectoriens.



BINARY LAND £8.95
Unite the couple in the complex maze.

FIRE RESCUE £7.95
Rescue the mice from a burning building.

QUICKSILVA:

FRED £7.95
Fred's adventures under the pyramids.

BOOGABOO (The Flea) £7.95
Avoid a deadly dragon inside deep caves.

ANT ATTACK £7.95
Escape the ancient city fighting ants.

THE SNOWMAN £7.95
Build a snowman avoid Monsters & Flames.

GAMES DESIGNER £9.95
Modify existing or write your own games.



AMPALSOFT:

The "CHESHIRE CAT EDUCATIONAL SERIES" of programs will be made available to MSX users.

ABOVE ARE ONLY A FEW OF THE MANY PROGRAMS AVAILABLE FOR YOUR MSX BY MAIL ORDER OR FROM YOUR LOCAL STOCKIST.

DON'T FORGET TO ASK YOUR DEALER FOR DETAILS OF CREDIT FACILITIES, EXTENDED GUARANTEES, ETC. AVAILABLE ON CERTAIN ITEMS.

AXIS

AT HOME WITH TECHNOLOGY

The Complete

Machine Code Tutor

Trust New Generation to strip the mystery away from Machine Code. Now the Complete Machine Code Tutor makes learning machine code simple so there's never been a better time to discover the really great benefits of machine code programming – see what the press says:

"A colourful, clear, interactive computer teaching package – the best I've come across in any field. Jan Watterson – **Popular Computing Weekly**"

"This pair of tapes forms a worthy addition to the range, giving a thorough exposition from the most elementary level of machine code programming on the BBC Micro. **Which Micro & Software Review**"

"The best machine code tutor and no serious Spectrum programmer should learn machine code without it. **Crash**"

"By far the best attempt comes from New Generation Software who has recently issued its Complete Machine Code Tutor for the BBC and the Spectrum. **Popular Computing Weekly**"

"New Generation have got a very nice product here. It's well thought out, easy to use, aesthetically pleasing, and (as far as I could tell) bug-free and crash-proof" . . . 'Overall then, an excellent idea, well executed. **Computing Today**"

Supplied with full notes, this package teaches machine code the way it should be taught – at your own pace and actually from the microcomputer, not from a book. You learn programming the professional way, plus a few tricks of the trade. Available from all good computer stores at £14.95.

New Generation Software

GSH

New Generation products are sold according to their terms of trade and conditions of sale.

FREEPOST, Bath BA2 4TD. Tel: 0225 316924

WHSMITH · John Menzies · WOOLWORTH · spectrum · Boots

COMPUTER LINK

CONNECTORS IDC

	Card Edge	(Transition) PCB	2 Row Socket
10-way	£1.20	£0.85	£0.80
14-way	–	–	£0.90
16-way	£1.50	£1.20	£1.00
20-way	£1.30	£1.35	£1.20
26-way	£2.40	£1.60	£1.40
34-way	£3.10	£1.95	£1.60
40-way	£3.40	£2.00	£1.85
50-way	£3.85	£2.25	£2.00
60-way	£4.80	£2.60	£2.25

IDC SHROUDED HEADERS WITH EJECTING LOCKING ARMS

	Straight	Right Angle
10-way	.85	.90
14-way	£1.00	£1.20
16-way	£1.25	£1.45
20-way	£1.40	£1.60
26-way	£1.70	£1.95
34-way	£2.00	£2.30
40-way	£2.15	£2.45
50-way	£2.30	£2.65
60-way	£2.45	£2.85

IDC D CONNECTORS

	Male	Female
9-way	£2.70	£3.20
15-way	£2.20	£3.70
25-way	£3.80	£4.45
37-way	£5.90	£6.80

IDC 25 WAY D CONN

Jumper Lead Ribbon Cable (RS232) Assembly

18" long Single End Male	£4.65
18" long S. End Female	£5.10
36" long D. Ended M/M	£9.75
36" long D. Ended F/F	£10.00
36" long D. Ended M/F	£9.85

IDC AMPHENOL PLUGS

(Centronics)

36-way £5.20

D CONNECTORS

Solder Bucket	Male	Female
9-way	.75	£1.00
15-way	.95	£1.50
25-way	£1.50	£1.90
37-way	£2.40	£3.25
HOODS .95		

DIL PLUG (Headers) IDC

Pins	
14	£0.90
16	£1.00
24	£1.40
40	£2.15

RIBBON CABLE (PRICE per ft)

	Grey	Rainbow
9-way	.13	.24
10-way	.15	.28
14-way	.18	.37
15-way	.20	.38
16-way	.22	.40
20-way	.30	.50
24-way	.36	.30
25-way	.40	.35
26-way	.45	.70
34-way	.60	.90
37-way	.65	.35
50-way	.70	.30
50-way	.95	£1.25
60-way	£1.10	£1.40
64-way	£1.15	£1.50

BBC OR SPECTRUM JOYSTICK INTERFACES

FOR USE WITH ANY ATARI TYPE JOYSTICK

ONLY £11.25

IDC JUMPERS 36" SINGLE ENDED

Ways	2 Row Socket	Card Edge	Transition PCB
10	£1.35	£1.95	£1.45
14	£1.70	–	–
16	£1.90	£2.45	£1.75
20	£2.20	£2.95	£1.95
26	£2.95	£3.85	£2.95
34	£3.40	£4.35	£3.35
40	£4.50	£5.65	£4.20
50	£5.25	£6.85	£5.20
60	£6.25	£8.25	£6.20

COMPUTER LEADS

BBC PRINTER LEAD 1 METRE – £10.40

Dual disk drive 1m £13.25

Single disk drive 1m £7.25

DRAGON PRINTER LEADS 1 METRE – £10.40

36-way Amphenol to 36-way Amphenol 1m £15.20

7 pin DIN Plug to 2x3.5mm 1x2.5m Jack plugs £2.25

5 Pin DIN Plug to 2x3.5mm 1x2.5mm Jack Plugs £2.20

6 Pin DIN Plug to 6 Pin DIN Plug £1.95

2x3.5mm Jack Plugs to 2x3.5mm Jack Plugs to £1.25

7 Pin DIN Plug to 5 Pin DIN Plug £1.95

7 Pin DIN Plug to 3 Pin DIN Plug & 2.5mm Jack Plug £2.25

7 Pin DIN Plug to 7 Pin DIN Plug £2.25

5 Pin Domino Plug to 5 Pin Domino Plug £1.95

Phono Plug to Coaxial TV Aerial Plug .95p

EDGE CONNECTORS

2x23 way (ZX81)	£1.85
2x28-way (Spectrum)	£2.10
2x3-way VIC20/64	£1.20

DOUBLE SIDED PLUG BOARDS

ZX81 23-way	£1.25
Spectrum 28-way	£1.50

CUSTOM ASSEMBLIES

ANY COMBINATION OF IDC & RIBBON CABLE LEADS MADE TO ORDER

COMPUTER CASSETTES

HIGH GRADE C12 46p; C15 47p

Qty. price 100 off 39p each

5 Pin Domino Plug	50p
6 Pin DIN Plug	50p
7 Pin DIN Plug	50p
8 Pin DIN Plug	50p

DIL PLUG HEADERS

Jumper Leads Ribbon Cable Assembly

Single ended leads:

Length	14 Pin	16 Pin	24 Pin	40 Pin
24"	£1.35	£1.55	£2.30	£3.20

Double ended leads:

Length	14 Pin	16 Pin	24 Pin	40 Pin
6"	£1.80	£2.00	£2.90	£3.25
12"	£1.90	£2.10	£3.10	£4.85
24"	£2.00	£2.25	£3.40	£5.30
36"	£2.25	£2.45	£3.65	£5.85

JOYSTICKS

A tough rugged high speed performance, two fast action fire buttons Atari type joystick with suction caps ONLY £8.25

SPECTRUM

IDC 56-way card edge £4.25

6 inch extn. cable dbl end M to F £10.50

12 inch extn cable dbl end M to F £10.75

Other configurations made to order – write or phone for quote

Please add 15% VAT

Free p&p C.W.O. or use

COMPUTER LINK Dept YC7, PO Box 1 Ware, Herts.

Telephone: 0920 5235

SKC®

PERFECTION ASSURED

FLOPPY DISKS MEET ANSI, DIN, ECMA, IBM, JIS AND SHUGART SPECIFICATIONS.

MINI FLOPPY DISK

EVERY DISK IS CERTIFIED AND GUARANTEED TO BE 100% ERROR FREE.

5¼" DISKETTES
Certified for Single OR Double Density media with hub ring
PRICES EXC VAT

48tpi suitable for 40 track
96tpi suitable for 80 track

	PRICE PER DISC QUANTITY 1-10	10-49	100+	
MD1-S/S 48 tpi	1.61	1.17	1.12	1.05
MD1-D S/S 48 tpi	1.70	1.23	1.17	1.10
MD2-D D/S 48 tpi	2.00	1.44	1.37	1.29
MD1-DD S/S 96 tpi	1.86	1.41	1.35	1.28
MD2-DD D/S 96 tpi	2.33	1.76	1.68	1.60

VIDEO TAPES

		PRICE PER BOX OF 10
VHS	E-180	£41.00
Beta	L-750	£44.00

CARRIAGE CHGS PLEASE SEND £2 FOR BOX OF TEN. ANY QUANTITY ABOVE 10 ALLOW £5 FOR NEXT DAY DELIVERY

Computer Cassettes

cat	playing time	per 100
C10	10 minutes	£23.00
C15	15 minutes	£24.00
C20	20 minutes	£25.00

High quality low noise cassette tapes. Short play, leaderless construction for use with computer cassette systems. Each tape in individual plastic library case with index card.

HOW TO ORDER. For disks add 50p per box of ten for p&p. First class mail for small packets — next day delivery for heavier ones. For cassettes allow £5 carriage costs (min order is 100) for next day delivery. Post/carriage costs add VAT.

P.V. TUBES

PLEASE ADD 15% VAT TO ALL PRICES

Dept. C
104 ABBEY STREET,
ACCRINGTON, LANCS BB5 1EE.
Telex: 635562 Griffin G for PV

Telephone:
(0254) 36521
(0254) 32611

Everything that happens in George Orwell's nightmarish vision of 1984 can occur and, in some cases, does occur today. Meirion Jones looks at the latest film of the book and discovers MPs using computers.

1984

WHO'S IN CONTROL—

"THERE'S NOTHING in this movie that isn't happening in the world today" warns Mike Radford — the Director of 1984. The film opens on October 12, giving a chance to compare the grim world of today with George Orwell's post war nightmare of hell on earth.

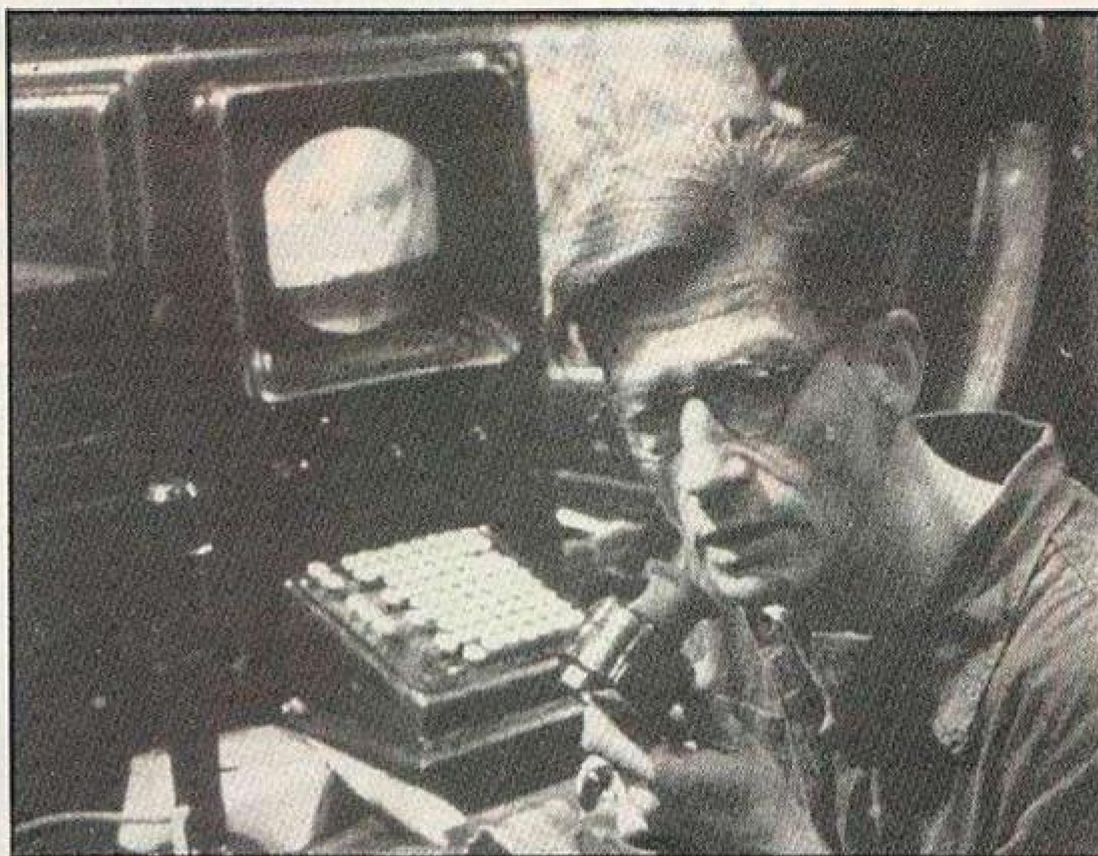
In 1948 when Orwell wrote the book he could not know how easy and undramatic computers would make the task of keeping tabs on people. His hero, Winston Smith, was in constant fear of the two-way televisions which watched him as he watched them. Today we don't think twice about being tracked around Woolworth's by a remote controlled camera hanging from the ceiling.

Instead of Big Brother is Watching You the High Street stores seem to prefer the slogan Shoplifters will be Prosecuted. The hundreds of traffic control cameras that hang from lamp-posts in most of our major cities do not rate a second glance.

There was only slight surprise earlier this year when it was revealed that the police had secretly set up a bank of cameras over the M1 motorway driving north out of London with a program which allowed them to pick out the registration numbers of cars speeding by and check them automatically against a list of suspect vehicles.

The list comes from the Driver Vehicle Licensing Centre at Swansea which keeps files on 20 million of us on computer. The Inland Revenue and the Department of Health and Social Security are gradually putting their files onto computer — which covers practically the whole population. Every time you use a cheque or a credit card a record of the transaction clocks up on a computer.

None of this is very worrying — so long as you are confident that the information will not be used by a repressive government against you. If you were less confident you might wonder why M15 — the section of the security services which spies on people inside



Britain — needed to secretly buy two ICL 2900 series mainframes with 20,000,000,000 bytes of storage.

Mike Radford's film of 1984 avoids the temptation to build high techology futuristic sets and instead tries to create the sort of 1984 Orwell himself envisaged. "I've created a world with nothing from the real world which has been created since 1948" says Mike "as though computers had been developed with vacuum tubes."

In the book, Winston Smith works in the Ministry of Truth where he sits at something called a Speakwrite machine, obeying orders to make changes to back copies of *The Times* to get rid of references which might show that the dictator Big Brother is lying and to remove all mention of people who have been denounced from the files.

Orwell's idea for the Speakwrite probably came from the successive issues of the Great Soviet Encyclopaedia in the 1930's produced under Stalin. One time rivals such as Trotsky were removed from the pages. Even photographs of scenes from the Russian Revolution were tampered with, inconvenient faces disappearing from the crowd.

Mike is very proud of the Speakwrite machine they created for the film — the machine in the picture which looks like a Bakelite word processor.

John Hurt — who plays Winston is sent a message in a tube telling him what to alter. He

(continued on page 73)

ONE OF THE *Your Computer* televisions has the annoying habit of switching channels if someone jogs the table or even if it is a bit draughty. So at this time of year in the middle of a game of Donkey Kong up pops the face of Dennis Healey or Norman Tebbit. You know that you are in the middle of the party political conference season.

But this year the major parties are taking strongly to computers with exhibitions at the Labour, Liberal and Conservative conferences by their own parties computer user's clubs. The 1983 General Election was the last in which the parties rely on purely manual methods for getting out their voters in the constituencies.

In future elections computers will be used to collate information from canvassing, send out junk mail to particular targets — education leaflets to parents for instance and of course to keep the accounts.

On January 9 this year Conservative Party Deputy Chairman Michael Spicer, MP for Worcester South, took delivery of the first computer system designed specifically for running a constituency. This was based on the Tycom micro which was advertised as "the future proof computer."

Unfortunately, the company itself was not so future proof and went into receivership. Despite this setback 60 Conservative constituencies have "gone silicon" this year using equipment including Apricots and ICL PCs. At ward level BBC micros are being used to organise canvassing.

"1984 in truth, was a long time in coming to the Labour Party". So says Roger Ward who has been seconded from the Association of Scientific, Technical and Managerial Staff to the Labour Party to help it computerise. But now the Labour Party Computer Advisory Group is pushing ahead and will be demonstrating Apricots, Spectrums and BBCs at the party conference.

The LPCAG is chaired by Jeremy Bray MP who is one of a clan of Scottish BBC micro enthusiasts on the opposition benches of the House of Commons. These include Bob Maxton and Dennis Canavan. The Labour Party is taking 100 pages on Micronet 800 to give information bulletins to a network of party users.

(continued from page 71)

has to dial up back numbers — until he can see the right issue on screen — then an actual copy of that edition of *The Times* is sent to him and he dictates his new article into a microphone. The new copy is printed out and sent off to be laid out in a new version of that edition of the paper. The instructions are burnt in a memory hole which destroys all record of the changes.

Mike Radford enjoys the irony that for all Winston's attempts to rebel against Big Brother he "enjoys his job — yet his job is altering the past." In the film, much of the equipment is out of order — although Winston walks around in fear of being seen not doing what he should, "a lot of the time the telly screens are broken." One of the messages of Mike's film is that "technology is often used to bamboozle."

Another is to beware of "the power of the media. That world of lies exists on our telly screens every day." Mike remembers during filming taking a break and going down to watch the news. "The Queen was laying a wreath on the tomb of Jomo Kenyatta". In the 1950's Kenyatta had led a bloody campaign to free Kenya from British rule. At the time Mike could remember him being painted as "the devil incarnate" yet here was the Queen calling him "the father of Africa".

Often the technology shown in the film "makes things difficult."

He makes a point from Schumacher's Small is Beautiful. "Schumacher made a distinction between technology which services mankind and technology which renders him useless." Mike Radford does not see home micros as much of a service. "I've not really found a good use for a home computer. People use them for shopping lists when it's easier to use a notebook."

YOU OR YOUR MICRO?

IF YOU COMFORT yourself with the thought that computers can never take over because they are not intelligent enough, try this Spectrum program from Marcel Feenstra based on an idea by Chris Harding — an Australian whose ability to do IQ tests has earned him a place in The Guinness Book of Records.

The program, HIQ Solver, can sovle three sorts of missing number problems from numerical IQ tests. These are sequences such as:

9,7,5,3,?

including more complicated sequences:

6,7,7,6,8,5,?

analogies of the form:

6(3)2
8(?)1

(continued on next page)

```
   0 REM ©1984 C. Harding and M
. Feenstra
   1 LET H=100: LET R=80: CLS :
PRINT AT 3,11;"HIQSOLVER 100";AT
 4,11;"==============";AT 6,9;"CO
PYRIGHT  © 1984";AT 7,10;"Chris.
 Harding";AT 8,16;"and";AT 9,10
;"Marcel Feenstra": FOR I=1 TO 5
00: NEXT I
   2 CLS : PRINT AT 3,9;"Is the
problem:";AT 5,6;"a S(equence of
 numbers)";AT 6,5;"an A(nalogy
of 6 numbers)";AT 7,3;"or a N(in
e number analogy)?";AT 9,3;"(Pre
ss the appropriate key)"
   3 LET I=CODE INKEY$: IF I=65
OR I=97 THEN GO TO 54
   4 IF I=78 OR I=110 THEN GO TO
 85
   5 IF I<>83 AND I<>115 THEN GO
 TO 3
   6 LET F=0: LET H=0: LET S=0:
LET L=10: LET L$="": CLS : PRINT
 AT 3,9;"How many numbers";AT 4,
5;"in the sequence (3-6)? ";
   7 LET Z=CODE INKEY$-48: IF Z<
3 OR Z>5 THEN GO TO 7
   8 PRINT Z: PRINT : DIM A(Z):
DIM B(Z-1): DIM C(Z-1): DIM J(Z-
2): DIM K(Z-2): DIM L(Z-2): DIM
M(Z-2): FOR I=1 TO Z: INPUT ("EN
TER #";I;": ");A(I): PRINT A(I);
",";: NEXT I: PRINT "?"
   9 LET A=0: LET T=1
  10 FOR D=-5 TO 5: LET C=D: IF
T=0 AND D<>0 THEN LET C=1/D
  11 LET MZ=0: LET LZ=0: LET KZ=
0: LET JZ=0: LET CZ=0: FOR I=1 T
O Z-1: LET B(I)=A(I+1)-A(I)*C: I
F A(I)=0 THEN LET CZ=1
  12 IF NOT CZ THEN LET C(I)=(A(
I+1)-D)/A(I): IF C(I)=0 THEN LET
 KZ=1
  13 NEXT I: FOR I=1 TO Z-2: LET
 M(I)=B(I+1)-B(I): IF B(I)=0 THE
N LET LZ=1
  14 IF NOT LZ THEN LET L(I)=B(I
+1)/B(I)
  15 IF CZ THEN GO TO 19
  16 FOR Q=1 TO Z-2: LET J(Q)=C(
Q+1)-C(Q): IF KZ THEN GO TO 18
  17 LET K(Q)=C(Q+1)/C(Q)
  18 NEXT Q
  19 NEXT I: IF Z>3 THEN GO TO 2
2
  20 IF M(1)<-2 OR M(1)>2 THEN L
ET MZ=1
  21 IF L(1)<>2 AND L(1)<>B(1) T
HEN LET LZ=1
  22 IF MZ THEN GO TO 25
  23 FOR I=1 TO Z-2: IF M(I)<>M(
1) THEN GO TO 25
  24 NEXT I: LET N=A(Z)*C+B(Z-1)
+M(1): GO SUB 40
  25 IF LZ THEN GO TO 28
  26 FOR I=1 TO Z-2: IF L(I)<>L(
1) THEN GO TO 28
  27 NEXT I: LET N=A(Z)*C+B(Z-1)
*L(1): GO SUB 40
  28 IF CZ THEN GO TO 34
  29 FOR I=1 TO Z-2: IF J(I)<>J(
1) THEN GO TO 31
  30 NEXT I: LET N=A(Z)*(C(Z-1)+
J(1))+D: GO SUB 40
  31 IF KZ THEN GO TO 34
  32 FOR I=1 TO Z-2: IF K(I)<>K(
1) THEN GO TO 34
  33 NEXT I: LET N=A(Z)*C(Z-1)*K
(1)+D: GO SUB 40
  34 IF A OR CZ THEN GO TO 36
  35 FOR I=1 TO Z-1: LET C(I)=1/
C(I): NEXT I: LET A=1: GO TO 16
  36 NEXT D: IF T THEN LET T=0:
GO TO 10
  37 IF Z=6 AND NOT S THEN LET S
=1: LET S2=A(2): LET S4=A(4): LE
T S6=A(6): LET A(1)=A(2): LET A(
2)=A(4): LET A(3)=A(6): LET Z=3:
 GO TO 9
  38 GO SUB 200: GO TO 6
  40 IF N=INT N THEN GO TO 43
  41 FOR I=1 TO Z: IF A(I)<>INT
A(I) THEN GO TO 43
  42 NEXT I: RETURN
  43 IF S THEN GO TO 45
  44 GO SUB H: RETURN
  45 IF NOT H THEN LET H=1: LET
A(1)=S2: LET A(2)=S4: LET A(3)=S
6: GO TO 9
  46 GO SUB H: RETURN
  54 DEF FN T(Q)=Q<>0 AND Q=INT
Q: DIM A(5): LET L=10: LET L$=""
: LET F=0: CLS : PRINT AT 3,9;"A
 (B) C";AT 5,9;"D (?) E";AT 7,9;
: FOR I=1 TO 5: INPUT ("ENTER ";
CHR$ (I+64);": ");A(I): PRINT A(
I);" ";: IF I=3 THEN PRINT AT 8,
9;
  55 IF I=1 THEN PRINT "( ";
  56 IF I=2 THEN PRINT ") ";
  57 IF I=4 THEN PRINT "(?) ";
  58 NEXT I: PRINT : PRINT : LET
 A=A(1): LET B=A(3): LET C=A(2):
 LET X=A(4): LET Y=A(5)
  59 IF C=0 THEN GO TO 66
  60 LET Q=(A+B)/C: IF FN T(Q) T
HEN LET N=(X+Y)/Q: GO SUB R
  61 LET Q=A*B/C: IF FN T(Q) THE
N LET N=X*Y/Q: GO SUB R
  62 LET Q=(A-B)/C: IF FN T(Q) T
HEN LET N=(X-Y)/Q: GO SUB R
  63 LET Q=(B-A)/C: IF FN T(Q) T
HEN LET N=(Y-X)/Q: GO SUB R
  64 IF B<>0 THEN LET Q=(A/B)/C:
 IF FN T(Q) AND Y<>0 THEN LET N=
(X/Y)/Q: GO SUB R
  65 IF A<>0 THEN LET Q=(B/A)/C:
 IF FN T(Q) AND X<>0 THEN LET N=
(Y/X)/Q: GO SUB R
  66 IF A+B<>0 THEN LET Q=C/(A+B
): IF Q=INT Q THEN LET N=(Y+X)*Q
: GO SUB R
  67 IF A+B<>0 THEN LET Q=C/(A+B
): IF Q=INT Q THEN LET N=(Y+X)*Q
: GO SUB R
  68 IF A*B<>0 THEN LET Q=C/(A*B
): IF Q=INT Q THEN LET N=Y*X*Q:
GO SUB R
  69 IF A-B<>0 THEN LET Q=C/(A-B
): IF Q=INT Q THEN LET N=(X-Y)*Q
: GO SUB R
  70 IF B-A<>0 THEN LET Q=C/(B-A
): IF Q=INT Q THEN LET N=(Y-X)*Q
: GO SUB R
  71 IF B=0 THEN GO TO 73
  72 IF A/B<>0 THEN LET Q=C/(A/B
): IF Q=INT Q AND Y<>0 THEN LET
N=(X/Y)*Q: GO SUB R
  73 IF A=0 THEN GO TO 75
  74 IF B/A<>0 THEN LET Q=C/(B/A
): IF Q=INT Q AND X<>0 THEN LET
N=(X/Y)*Q: GO SUB R
  75 IF A>B AND Y>X OR B>A AND X
>Y THEN LET A=A(3): LET B=A(1):
GO TO 59
  76 GO SUB 200: GO TO 54
  80 IF N=INT N THEN GO TO 83
  81 FOR I=1 TO 5: IF A(I)<>INT
A(I) THEN GO TO 83
  82 NEXT I: RETURN
  83 GO SUB H: RETURN
  85 LET L=10: LET L$="": LET F=
0: DIM A(8): CLS : PRINT AT 2,15
;"A B C";AT 3,15;"D E F";AT 4,15
;"G H ?"
  86 PRINT AT 6,15;: FOR I=1 TO
8: INPUT ("ENTER ";CHR$ (I+64);"
: ");A(I): PRINT A(I);" ";: IF I
=3 THEN PRINT AT 7,15;
  87 IF I=6 THEN PRINT AT 8,15;
  88 IF I=8 THEN PRINT "?": PRIN
T
  89 NEXT I: PRINT : PRINT : IF
A(2)=0 THEN GO TO 92
  90 LET Z=(A(3)+A(1))/A(2): IF
A(6)=A(5)*Z-A(4) THEN LET N=A(8)
*Z-A(7): GO SUB H
  91 LET Z=(A(3)-A(1))/A(2): IF
A(6)=A(5)*Z+A(4) THEN LET N=A(8)
*Z+A(7): GO SUB H
  92 IF A(1)=0 THEN GO TO 95
  93 LET Z=(A(3)-A(2))/A(1): IF
A(6)=A(4)*Z+A(5) THEN LET N=A(7)
*Z+A(8): GO SUB H
  94 LET Z=(A(3)+A(2))/A(1): IF
A(6)=A(4)*Z-A(5) THEN LET N=A(7)
*Z-A(8): GO SUB H
  95 IF A(1)+A(2)<>0 THEN LET Z=
A(3)/(A(1)+A(2)): IF A(6)=(A(4)+
A(5))*Z THEN LET N=(A(7)+A(8))*Z
: GO SUB H
  96 IF A(1)-A(2)<>0 THEN LET Z=
A(3)/(A(1)-A(2)): IF A(6)=(A(4)-
A(5))*Z THEN LET N=(A(7)-A(8))*Z
: GO SUB H
  97 IF A(2)-A(1)<>0 THEN LET Z=
A(3)/(A(2)-A(1)): IF A(6)=(A(5)-
A(4))*Z THEN LET N=(A(8)-A(7))*Z
: GO SUB H
  98 IF ABS (A(2)-A(1))<>0 THEN
LET Z=A(3)/ABS (A(2)-A(1)): IF A
(6)=ABS (A(5)-A(4))*Z THEN LET N
=ABS (A(8)-A(7))*Z: GO SUB H
  99 GO SUB 200: GO TO 85
 100 IF N>255 OR N<1 THEN GO TO
103
 101 IF CHR$ N<>L$ THEN GO TO 10
4
 102 RETURN
 103 IF L=N THEN RETURN
 104 IF NOT F THEN PRINT "The mi
ssing number is ";N
 105 IF F THEN PRINT "or it is "
;N
 106 LET F=F+1: IF N<1 OR N>255
THEN LET L=N: RETURN
 107 LET L$=CHR$ N: RETURN
 200 PRINT "There's no ";: IF F
THEN PRINT "other ";
 210 PRINT "known solution.": PR
INT "You can press Q to QUIT,":
PRINT "C to CHANGE type of probl
em,": PRINT "or any other key to
 continue.": BEEP .05,10
 220 LET Z=CODE INKEY$: IF Z=0 T
HEN GO TO 220
 230 IF Z=81 OR Z=113 THEN STOP
 240 IF Z=67 OR Z=99 THEN GO TO
2
 250 RETURN
```





(continued from previous page)

and nine number analogies:

2,3,1,
4,3,5,
2,0,?,

On an Eysenck IQ test a Spectrum running HIQSolver achieved an IQ of 160 — enough to qualify it for membership of societies for those who want to meet other people who are good at doing IQ tests — like Mensa which includes Sir Clive Sinclair among its members, and the International Society for Philosophical Enquiry which Chris Harding and Marcel Feenstra belong to.

This high score is despite the fact that "the program has not been written especially for the Eysenck test. It is capable of finding patterns that are more complex than the ones found there," says Marcel Feenstra, and he adds, "It is relatively small and simple, so one really wonders what it means to have a high score on an IQ test."

Despite HIQSolver's 160 score William Head, International President of the ISPE is not having it in his society — "we're talking about people, a computer wouldn't be eligible." But times change. Chris Harding hopes to improve the program "in time we'd like to come up with a general problem solving device able to tackle the real world."

Such a machine would probably be better at IQ tests than simple humans and as William Head believes that those — like himself — who are good at IQ tests "tend to be more ethical than the rest of us" there seems no rational obstacle to handing over all decisions to the general problem solving device — for the good of all of us. So enter this program with care. ■

64K User RAM

and not a bit less...

New Prices! MTX 512 £275.00 INC. VAT

The MTX512 comes with 64K RAM, expandable to 512K. Add to this another 16K VideoRAM dedicated solely to handling the screen memory, and you've got 80K. But how much user RAM is left when you're running high resolution graphics programs? Unlike other machines, the answer is still 64K because the MTX512 uses the 16K VideoRAM plus a second processor – the Texas TMS9929A – to take care of screen graphics. The main processor used in the MTX512 is the Zilog Z80A, which gives the MTX Series CP/M compatibility – CP/M was written around the Zilog Series. And the Z80A inside the 512 operates at 4MHz.

Expansion is no problem with the MTX Series, because it is designed as an interlocking system – from the MTX512 up to the powerful Memotech Silicon Disc Systems.

MEMOTECH MTX512 MAJOR FEATURES

STANDARD I/O PORTS

- Variable rate cassette port (up to 2400 baud)
- Two joystick ports using Atari configuration
- Centronics-type parallel printer port
- ROM cartridge port
- Uncommitted parallel input/output port
- Internal ROM board port
- Hi-Fi output port
- 4-channel sound through TV speaker
- PAL composite video colour Monitor port

THE RS232 COMMUNICATIONS BOARD

(required for disc expansions)

- Two independent RS232 ports
- 60-way Disc Drive Bus supporting up to four 5.25 and/or 8 inch floppy disc drives, Memotech Silicon Discs, and Hard Discs

USER RAM

- Expandable to 512K in increments of 64, 128, or 256K

24K OF ROM which includes:

- MTX BASIC
- Noddy, a simple, text-handling language
- A powerful Assembler/Dissassembler – sections of machine code can be created and run by calling the Assembler from within BASIC
- The sophisticated Front Panel, which displays the contents of all registers (including the F flag register) and pointers during program execution
- All four languages can be used interactively with each other, and with the user

ROM EXPANSIONS

- MTX NewWord, a 32K word processing package
- Hisoft PASCAL, written specially for the MTX Series

THE KEYBOARD

- Full size, 79-key, full-stroke professional quality keyboard incorporating:
- Main Block with typewriter-style layout
- A separate 12-key numeric/editor keypad
- Eight programmable function keys (16 with shift)

GRAPHICS FACILITIES

HI-RES GRAPHICS MODE

- 256 × 192 pixel resolution plus
- 32 × 24 Text in 16 foreground and background colours
- All 16 colours (i.e. 15 colours plus transparent) are available on the screen together
- 32 user-definable easily controllable sprites
- 128 separate GENPAT statements providing a huge range of user-defined characters

TEXT MODE

- Text resolution is 40 × 24 characters plus
- 128 user-defined characters
- Eight user-definable virtual screens or "windows"

SINGLE 5.25" DISC DRIVE – £399.00 inc VAT

Comprising one Qume double-sided, double-density 500K drive, plus the Memotech Floppy Disc Controller Board, with power supply, expansion sockets, and sturdy aluminium case.

Single Disc System Software: MTX Single Disc BASIC extensions on ROM, plus Renumber, 40 Column Text and Graphics Screen, Binary to Hex to Decimal Converter, Data save and load plus five games.

For further information, please contact:

MEMOTECH

MEMOTECH LIMITED STATION LANE INDUSTRIAL ESTATE WITNEY OXON OX8 6BX TELEPHONE: (0993) 2977 TELEX: 83372 MEMTEC G



LOONA RESCUE

Save the refugees from their home planet by dropping in a landing pod. David Griffin and the BBC micro take you on a rescue mission.

LIFE ON THE father planet became unpleasant — pollution, wars and crime were rife. A selection of upright and intelligent citizens were chosen by the supreme government, their mission — to set up a colony on a new planet in the outer reaches of the galaxy. The project was successful, life on the colonial planet was peaceful for many generations.

Neighbouring colonies observed their life-style and became envious of treasures and riches. The inevitable happened — the neighbours invaded, destroying all and pillaging anything of value. The colony was helpless and so the executive commanders ordered evacuation.

A fleet of motherships was launched with the majority of the population. The problem was with the members of the colony in the least accessible parts of the planet. It was decided that the best way to evacuate these humanoids was to drop small landing pods from the mothership to collect them individually and ferry them up to the evacuation craft.

The task is a difficult one due to orbiting meteors and asteroids just above the atmosphere and the invading forces placed mines in stationary orbits around the planet. Only the best pilots are suitable for this demanding mission. You, as an officer of the rescue services, have been called upon to supervise the rescue of these men.

The program in this article was written for the 32K BBC, and although designed on a 1.2 OS, Basic I machine, should work on all other cassette-based systems except where the Tube is used.

The game is a mixture of machine code and Basic. The machine code is employed to execute the more time-consuming routines of moving the mothership and meteors. These are driven by events — see User Guide — and use direct accessing of the screen memory — which is why the program will not work with second processors — for fast motion of multi-colour characters.

For smooth animation, the machine code is called at the start of every television field pulse. This is enabled by

```
*FX 14,4
```

and disabled by

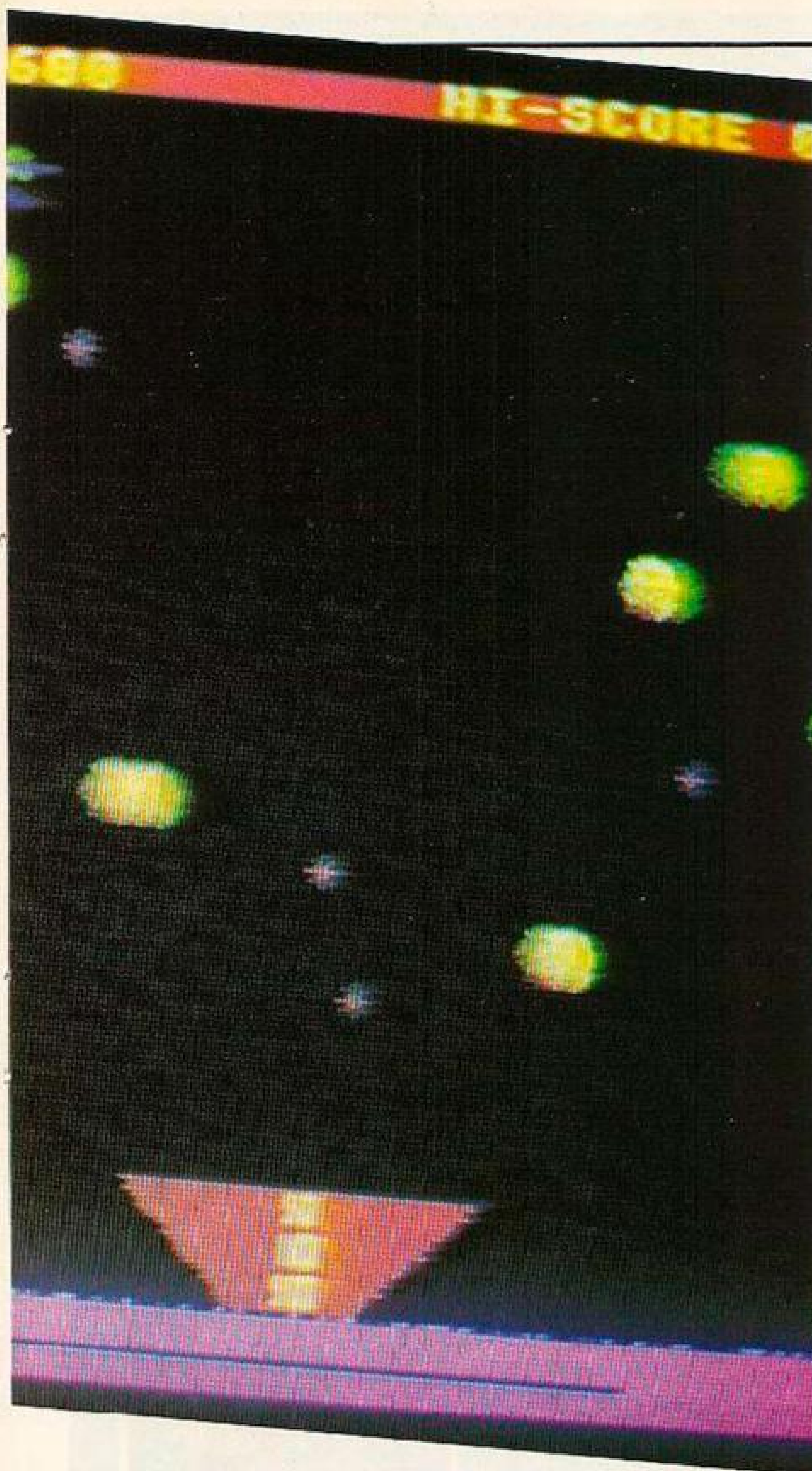
```
*FX 13,4
```

Program 1.

```
  1 REM Frogram 1
  2
  3 REM Header for final programs
  4
  5 REM save as 'LOONA.RESq'
  6
 10 MODE 7
 20 FOR Y=2 TO 23:VDU 31.5.Y.132,157,-150*(Y<7)-145*
(Y>6 AND Y<13)-135*(Y>12),31,34,Y,156:NEXT
 30 PRINT TAB(10.3)"pp   p0  p0_0 _p _p"
 40 PRINT TAB(10,4)"j5  "!""4"!""4"CHR$255"t 5h!"")"
 50 PRINT TAB(10,5)"j5 4"CHR$255"  5"CHR$255"  55+)5
j//"CHR$255
 60 PRINT TAB(10,6)".-.%""-k ""-&(- "'%.#(/#"
 70 PRINT TAB(8,7)"l<,t( ,!_<,t x.tl< 1,!.!"
 80 PRINT TAB(8,8)"j5 "CHR$255" 'CHR$255'h""j5 ""j5
""j5 j "CHR$255"h"'"
 90 PRINT TAB(8,9)"j7+t 'CHR$255'k  '')j5  j5 j "CHR
$255"k"
100 PRINT TAB(8.10)"j5 "CHR$255" "CHR$255" ii  "CHR$
255"j5 jj5 j 'CHR$255" j"
110 PRINT TAB(8,11)".- +,/,/""-,' +,' +,!(/,/'
120 PRINT TAB(8,15)CHR$131"(c) David Griffin 1984"
130 ENVELOPE 1,1.0,0,0,0,0,0,126,-1,-1,-1,126,125
140 ENVELOPE 2,1,1,1,1,0,0,0,10,-1,-1,-1,40,20
150 ENVELOPE 3,1.-1,-1,-1,0,0,0,126,-1,-1,-1,126,100
160 ENVELOPE 4,1,0,0,0,0,0,0,10,-1,-1,-1,40,20
170 VDU 28,12,22.31,18
180 *L. 'LOONA.1"
190 PAGE=&D00:CHAIN "LOONA.2"
```

Program 2.

```
  1 REM Program 2
  2
  3 REM meteor and mothership graphics
  4
 10 A=&900
 20 FOR I=1 TO 8
 30 READ A$
 40 FOR J=1 TO LEN(A$) STEP 2
 50 B$=MID$(A$.J.2)
 60 B=EVAL("&"+B$)
 70 ?A=B
 80 A=A+1
 90 NEXT,
100 END
110 DATA 000000000000000000C00000000C1031300003 3FF7FB
FFF5F000CEEFFFF7EFFFF0000008B
120 DATA CCCCEEEE0000000000C0000000C0000000000000000030
30100000C00007F9F6F0F0F010000
130 DATA 7FDFBF9F2F1F0000EECCEECC3C0000000000000000
00000000C00000000000000000000
140 DATA 000000000000000000011770F00C0000011FFFF0F000
01030FFFFFF0F30C00000FFFFFF0F
150 DATA C0300000FFFFFF0F00C080C0FFFFFF0F000000008BF
FFF0F000C0000008BEE0F0000000
160 DATA 00000000000000000000C0000000C00000000000000F00
00000000C0000F0FF67010000 1070
170 DATA F0FF6F0F1070E0F0F0FF6F0F0EC80000F0FF6F00000
00000F0FF6F0000000000F0FF6F0F
180 DATA 07010000F0FF6F0F80E070F0F0FF6E0800080E0F00
00000000C0000000000000000000
```



Program 3.

```
  1 REM Program 3
  2
  3 REM Machine code to move meteors and mother ship
  4
 10 FOR P=0 TO 3 STEP 3
 20 P%=&A20
 30 [OPT P
 40 .update
 50 LDA &6A:CMP #1:BEQ ok
 60 LDA &6B:EOR #1:STA &6B:CMP #1:BEQ ret
 70 .ok LDA &69:CMP #1:BNE ast
 80 JSR mother
 90 .ast JSR asteroid
100 .ret RTS
110 \
120 \
130 .mother
140 LDA &8C:CMP #1:BNE mback
150 CLC:LDA &8E:ADC #8:STA &8E:LDA #0:ADC &8F:STA &8
F
160 INC &8D:LDA &8D:CMP #68:BCC mprint
170 LDA #255:STA &8C:JMP mprint
180 .mback SEC:LDA &8E:SBC #8:STA &8E:LDA &8F:SBC #0
:STA &8F
190 DEC &8D:LDA &8D:CMP #0:BNE mprint
200 LDA #1:STA &8C
210 .mprint
220 LDY #0
230 CLC:LDA &8E:ADC #&80:STA &6E:LDA #2:ADC &8F:STA
&6F
240 .mloop LDA &960,Y:STA (&8E),Y
250 LDA &9C0,Y:STA (&6E),Y
260 INY:CPY #96:BCC mloop
270 RTS
280 \
290 \
300 .asteroid LDA #1:EOR &68:STA &68
310 LDX #0
320 .loop CPX #8:BNE pass:JMP check
330 .pass CPX #20:BNE pass1
340 .check LDA &68:CMP #1:BNE next
350 .pass1
360 LDA &73,X:CMP #1:BNE back
370 CLC:LDA &70,X:ADC #8:STA &70,X:LDA #0:ADC &71,X:
STA &71,X
380 INC &72,X:LDA &72,X:CMP #74:BCC print
390 LDA #255:STA &73,X:JMP print
400 .back SEC:LDA &70,X:SBC #8:STA &70,X:LDA &71,X:S
BC #0:STA &71,X
410 DEC &72,X:LDA &72,X:CMP #0:BNE print
420 LDA #1:STA &73.X
430 .print LDY #0
440 LDA &71,X:STA &6D
450 LDA &70,X:STA &6C
460 CLC:ADC #&80:STA &6E
470 LDA &71,X:ADC #2:STA &AF
480 .loop1
490 LDA &900,Y:STA (&6C),Y
500 LDA &930,Y:STA (&6E),Y
510 INY:CPY #48:BNE loop1
520 .next INX:INX:INX:INX:CPX #25:BCC loop
530 RTS
540 ]
550 NEXT
```

the event indirecting through &220 — that is, the memory location of the start of my event handling routine is stored in locations &220 and &221 — see line 1580 of program 5.

The reason I chose to use events is that the necessary moving characters will do so apparently automatically, leaving the Basic program running at almost normal speed to handle the setting up of the screen and the general working of the game.

Type in five programs

To get the final version of the game onto cassette it is necessary to type in five programs.

The first is the header for the game proper. Program 2 contains the data for the graphic characters of the mothership and meteors, and the procedure for storing that data in memory. Care should be taken when typing the data statements. If characters look strange it will probably be due to typing errors in this section.

Program 3 contains the assembler for the machine-code routines. Program 4 holds the definitions of the characters used in the game. Program 5 is the game itself and, due to its length, will be prone to typing errors. It may be helpful to replace line 20 with

20 ON ERROR MODE 7:REPORT:PRINT "at line";ERL:END

when developing the program, to trap any errors.

Program 4.

```
  1 REM Program 4
  2
  3 REM User defined characters
  4
 10 VDU 23,241,255,255,255,255,255,255,255,255
 20 VDU 23,242,255,63,127,31,15,15,7,3
 30 VDU 23,243,254,254,248,252,224,224,192,128
 40 VDU 23,254,15,63,195,195,63,15,51,195
 50 VDU 23,255,192,240,12,12,240,192,48,12
 60 VDU 23,246,24,24,60,90,153,60,36,102
 70 VDU 23,247,16,84,56,254,56,84,16,0
 80 VDU 23,138,&FF,&20,&6A,&2A,&AA,&AA,&20,&FF
 90 VDU 23,139,&FF,&A0,&AA,&AA,&AA,&AA,&A0,&7F
100 VDU 23,140,&FF,&91,&85,&95,&D5,&D5,&91,&FF
110 VDU 23,148,0,&56,&54,&76,&54,&56,0,0
120 VDU 23,149,0,&90,&95,&90,&90,&D1,0,0
130 VDU 23,157,&09,&4A,&24,&C0,3,&24,&52,&91
```

The following procedure should be adopted to obtain the program correctly and to store it on cassette.

1. Type in program 1 and save it on tape by, SAVE "LOONA.FESq" (RETURN) (RETURN)
2. Type in program 2 and RUN it.
3. Type in program 3 and RUN it.
4. Type in program 4 and RUN it.
5. Save the above information with, *SAVE "LOONA.1" 900 D00 (RETURN) (RETURN)
6. Type in program 5 and save it on tape, SAVE "LOONA.2" (RETURN) (RETURN)

Although it is not necessary to save programs 2, 3 and 4 on the final cassette, it would be wise to save each program on some other cassette, and then it will be possible to check each of these as well as program 5 for typing errors, if the game does not work.

You will probably have noticed that the character definitions are in one of the tem-

(continued on page 79)

(continued from page 77)

porary programs and the VDU 23s are not stored in one of the final programs. This is taken care of with the *Save in procedure 5 above. I have made use of the fact that the definitions are stored in the computer's memory between locations &C00 and &D00, and so are loaded directly into memory.

For lazy people or those who would rather just play the game than enjoy the frills of title pages, tunes or high score tables, it is possible to type a shorter version.

Omit lines 20 to 120 from program 1 and the following lines should be left out from program 5:

100
230 to 250
2230 to 2380
2450 to 2480
2500 to 2660
2680 to 2790
2850 to 2940
insert 230 GOTO 30

For even lazier people the complete program is available on cassette. Send £4, or £3 and a blank cassette and SAE to David Griffin, 31 Apsley Road, Oldbury, Warley, West Midlands B68 0QY. Alternatively for those lazy people who are lucky or rich enough to own a modem, the game is available on Prestel via the pages of Viewfax 258. ■

Program 5.

```
1REM Program 5
2
3REM 'LOONA RESCUE' - the game proper
4
5REM by David Griffin
6
10PROCINITSET
20ON ERROR GOTO 30
30SCORE=0:LIVES=3:CRASH=0:SHEET=1
40MODE 7:PROCTITLE
50*FX 15 4
60MODE 1:VDU 23;8202;0;0;0;
70PROCSET
80?&69=0
90*FX 14 4
100PROCTUNE
110TIME=0
120PROCLIVES
130?&69=1:REPEAT:PROCUPDATE:UNTIL INKEY-99
140LIVES=LIVES-1:PROCLIVES
150PROCDOWN
160IF CRASH=1 YY=YY-.5:PROCCRASH:IF LIVES=0 PROCOVER
:GOTO 230
170IF CRASH=1 GOTO 200
180PROCUP
190IF CRASH=1 YY=YY+.5:PROCCRASH:IF LIVES=0 PROCOVER
:GOTO 230
200IF BASE=6 PROCSHEET:GOTO 50
210PROCMEN
220GOTO 130
230MODE 7
240PROCTABLE
250GOTO30
260DEFPROCDOWN
270YY=4:XX=INT(?&80/2)+3
280DD=0
290IF INKEY-105 AND XX>0 DD=-1:SOUND 0,4,5,1
300IF INKEY-104 AND XX<38 DD=1:SOUND 0,4,5,1
310XX=XX+DD:YY=YY+.5
320VDU 31,XX-DD,YY-.5,32,32
330IF FNA(XX,YY)<>32 OR FNA(XX+1,YY)<>32 PROCLAND:EN
DPROC
340COLOUR 2:VDU 31,XX,YY,254,255
350PROCUPDATE
360IF INKEY-99 PROCDEL(5)
370GOTO 280
380DEFPROCUP
390YY=YY-1
400DD=0
410IF INKEY-105 AND XX>0 DD=-1:SOUND 0,4,5,1
420IF INKEY-104 AND XX<38 DD=1:SOUND 0,4,5,1
430XX=XX+DD:YY=YY-.5:IF YY<3 CRASH=1:ENDPROC
440VDU 31,XX-DD,YY+.5,32,32
450IF FNA(XX,YY)<>32 OR FNA(XX+1,YY)<>32 PROCDOCK:EN
DPROC
460COLOUR 2:VDU 31,XX,YY,254,255
470PROCUPDATE
480IF YY<15 ?&69=0
490GOTO 400
500DEFPROCLAND
510CRASH=0
520IF YY<27 OR YY>29 CRASH=1:ENDPROC
530IF XX<5 OR XX>35 CRASH=1:ENDPROC
540IF FNA(XX,YY)=32 OR FNA(XX+1,YY)=32 CRASH=1:ENDPR
OC
550IF YY=27 SCORE=SCORE+50
560IF YY=28 SCORE=SCORE+100
570IF YY=29 SCORE=SCORE+500
580PROCSCORE
590COLOUR 2:VDU 31,XX,YY-1,254,255
600EN=MI(BASE)*32
610VDU 31,MI(BASE),29,32
620MI(BASE)=0
630GCOL 3,1
640VDU 5
650FOR I=EN TO XX*32 STEP SGN(XX*32-EN)*4
660MOVE I,50:VDU 150
670PROCDEL(3)
680MOVE I,50:VDU 150
690NEXT
700VDU 4
710REPEAT PROCUPDATE:UNTIL INKEY-99
720IF XX>4 AND XX<14 PRINT TAB(5,YY)R$
730IF XX>15 AND XX<25 PRINT TAB(16,YY)R$
740IF XX>25 AND XX<36 PRINT TAB(27,YY)R$
750BASE=BASE+1
760ENDPROC
770DEFPROCDOCK
780MP=INT(?&80/2)
790IF INT(YY)<>3 OR XX=MP-1 CRASH=1:ENDPROC
800IF XX=MP OR XX-3=MP PROCFALL:MEN=MEN-1
810MEN=MEN+1
820LIVES=LIVES+1:PROCLIVES
830ENDPROC
840DEFPROCFALL
850COLOUR 2:VDU 31,XX,YY+1,254,255
860FY=YY+2
870COLOUR 3
880VDU 31,XX,FY,32
890SOUND &11,3,255-(FY*5),3
900FY=FY+.5
910IF FNA(XX,FY)<>32 THEN 940
920VDU 246
930GOTO 880
940*FX 15 4
950FY=FY-.5
960VDU 31,XX,FY,246
970FOR I=4 TO 6:SOUND 0,1,1,3:NEXT
980VDU19,0,3,0,0,0:PROCDEL(5):VDU 19,0,0,0,0,0
990FOR I=1 TO 5:VDU 31,XX,FY,246:PROCDEL(10):VDU 31,
XX,FY,253:PROCDEL(10):NEXT
1000PROCDEL(5)
1010VDU 31,XX,FY,32,31,XX,YY+1,32,32
1020*FX 14 4
1030ENDPROC
1040DEFPROCUPDATE
1050IF TIME/20=TIME DIV 20 AND TIME<12240 GCOL 0,0:MO
VE 176,24:DRAW 1200-TIME/10,24:GCOL 0,2:DRAW 1210,24
1060IF M(4)=0 VDU 31,1,28,32,32
1070IF M(5)=0 VDU 31,37,28,32,32:ENDPROC
1080IF help<>0 AND RND(20)<>1 ENDPROC
1090IF help<>0 VDU 31,help,28,32,32:help=0:ENDPROC
1100IF RND(20)<>1 ENDPROC
1110help=1+RND(2)-1)*36
1120IF help=1 AND M(4)=0 help=37
1130VDU 31,help,28,148,149
1140ENDPROC
1150DEFPROCCRASH
1160*FX 13 4
1170C=3:FOR I=1 TO 10:C=3-C:COLOUR C:VDU 31,XX,YY,0,3
2,254,255,32:PROCDEL(5):NEXT
1180FOR PP=200 TO 100 STEP -100:VDU 19,0,3,0,0,0:FOR
DEL=1 TO PP:NEXT:VDU 19,0,0,0,0,0:FOR DEL=1 TO PP:NEXT
1190VDU 31,XX,YY,32,32
1200XXX=XX*32+32:YYY=(31-YY)*32-32
1210GCOL 3,2
1220FOR PP=4 TO 24 STEP 2
1230NN=(PP+PP)+RND(50)-25
1240FOR I=1 TO 2
1250PLOT 69,XXX-NN,YYY:PLOT 69,XXX+NN,YYY+NN:PLOT 69,
XXX,YYY+NN:PLOT 69,XXX+NN,YYY+NN:PLOT 69,XXX+NN,YYY:PL
OT 69,XXX+NN,YYY-NN:PLOT 69,XXX,YYY-NN:PLOT 69,XXX-NN,
YYY-NN
1260NEXT
1270IF PP=4 FOR I=4 TO 6:SOUND 0,1,1,4:NEXT
1280NEXT
1290*FX 14 4
1300PROCSCORE
1310ENDPROC
1320DEFPROCLIVES
1330IF LIVES=0 VDU 31,30,1,32,32:GOTO 1380
1340COLOUR 2
1350FOR I=1 TO LIVES
1360VDU 31,I*3+27,1,254,255,32,32,32
1370NEXT
1380ENDPROC
1390DEFPROCSET
1400MEN=0:BASE=0:help=0:R$=""
1410HSCORE=HS(0)
1420VDU 19,2,5,0,0,0,19,3,3,0,0,0
1430M=10:S=1
1440COLOUR 129:PRINT TAB(0,0);STRING$(39," ");:PROCSC
ORE
1450GOTO 1470
1460FOR I=0 TO 5:READ MI(I):NEXT
1470DATA 3,36,2,37,1,38
1480FOR I=0 TO 6
1490X=I*3+3:X=RND(72)+1
1500X=&3000+Y*640+X*8
1510?(&70+I*4)=A MOD 256
1520?(&71+I*4)=A DIV 256
1530?(&72+I*4)=X
1540?(&73+I*4)=RND(2)
1550NEXT
1560?&6B=0:?&69=1:?&6A=0:?&6E=1:?&80=1:?&8D=33:?&3E=8
:?&8F=&36
1570IF SHEET>2 ?&6B=1
1580?&220=&20:?&221=&A
1590CALL &A00
1600CALL &A20
1610GCOL 0,3
1620MOVE 0,0:DRAW 1280,0:PLOT 85,0,56:PLOT 85,1280,56
1630FOR IX=0 TO 1280 STEP 4:MOVE IX,32:DRAW IX,50+RND
(2)*4:NEXT
1640VDU 5:GCOL 0,0
1650MOVE 32,40:PRINT "time"
1660VDU 4
1670S50$=CHR$146+CHR$145+CHR$142+CHR$142+CHR$17+CHR$1
31+CHR$140+CHR$17+CHR$128+CHR$145+CHR$145+CHR$145+CHR$
147
1680S100$=CHR$146+CHR$115+CHR$145+CHR$17+CHR$131+CHR$
139+CHR$17+CHR$128+CHR$145+CHR$145+CHR$147
1690S500$=CHR$146+CHR$145+CHR$17+CHR$131+CHR$138+CHR$
17+CHR$128+CHR$145+CHR$147
1700COLOUR 1
1710PRINT TAB(7,29)S50$SPC(6)S500$SPC(6)S50$
1720PRINT TAB(17,28)S100$SPC(4)S100$
1730PRINT TAB(16,27)S50$
1740COLOUR 3
1750VDU 31,1,27,150,150,150,31,36,27,150,150,150
1760IF SHEET<2 GOTO 1850
1770COLOUR 1
1780FOR I=0 TO 5
1790VDU 31,RND(36)+1,I*3+7,151
1800SOUND 1,-10,150-I*20,2
1810PROCDEL(30)
1820NEXT
1830ENDPROC
1840DEFPROCMEN
1850IF MEN>=1 COLOUR 3:FOR I=1 TO MEN:VDU 31,I*2,1,24
6:NEXT
1860ENDPROC
1870DEFPROCSCORE:COLOUR 3:COLOUR 129:SC$=STR$(SCORE):
SC$=(STRING$(6-LEN(SC$),"0"))+SC$:PRINT TAB(2,0);"SCOR
E ";SC$;
1880 PRINT TAB(22,0);"HI-SCORE ";:SC$=STR$(HSCORE):SC
$=(STRING$(6-LEN(SC$),"0"))+SC$:PRINT SC$;:COLOUR 3:CO
LOUR 128:ENDPROC
1890DEFFNA(X%,Y%):VDU 31,X%,Y%:A%=135:=(USR &FFF4 AND
&FFFF) DIV &100
1900DEFPROCSHEET
1910*FX 13 4
1920IF MEN=0 GOTO 1980
1930FOR I=MEN TO 1 STEP -1
1940COLOUR 2
1950FOR N=1 TO 3:VDU 31,I*2,1,150:PROCDEL(5):VDU 31,I
*2,1,32:PROCDEL(7):NEXT
1960SOUND 1,1,I*20,1:SCORE=SCORE+100*SHEET:PROCSCORE
1970NEXT
1980VDU 28,0,26,39,4,12,26
1990T=TIME/10
2000IF (1200-T)<=176 GOTO 2080
2010FOR I=1200-T TO 176 STEP -16
2020COLOUR 1:PRINT TAB(17,14)"BONUS"
2030GCOL 0,0:MOVE 176,24:DRAW I,24:GCOL 0,2:DRAW 1200
,24
2040SCORE=SCORE+5
2050PROCSCORE
2060SOUND 1,-15,I/5,1
2070NEXT
2080SHEET=SHEET+1
2090IF SHEET>5 SHEET=5
2100ENDPROC
2110DEFPROCOVER
2120*FX 13 4
2130VDU 28,0,26,39,4,12,26
2140COLOUR 3
2150PRINT TAB(15,12)"GAME OVER"
2160GCOL 0,1
2170FOR I=0 TO 200 STEP 8
2180MOVE 464-I,592-I:DRAW 784+I,592-I
2190DRAW 784+I,656+I:DRAW 464-I,656+I:DRAW 464-I,592-
I
2200NEXT
2210VDU 28,0,26,39,4,12,26
2220ENDPROC
2230DEFPROCTUNE
2240RESTORE 2380
2250MP=2
2260FOR L=1 TO 38
2270READ A$
2280B=LEN(A$)-1
2290FOR I=1 TO 3
2300C=EVAL("&020"+STR$(I))
2310T=4*(ASC(MID$(A$,I,1))-56)
2320V=-1
2330IF MID$(A$,I,1)=" " V=0
2340SOUND C,V,T,3
2350NEXT
2360FOR DEL=1 TO 1000:NEXT
2370ENDPROC
2380DATA I  ,G  ,@  ,@DL,@DL,I  ,G  ,@  ,@DL,@DL,I  ,
G  ,@  ,@DL,=  ,=DL,I  ,IEK,EK ,I  ,G  ,I  ,IEK,EK ,I
 ,G  ,I  ,IEK,EK ,I  ,G  ,I  ,IEK,=  ,=EK,@  ,@DL,@DL
=
2390DEFPROCDEL(D)
2400T=TIME
2410REPEAT UNTIL TIME>T+D
2420ENDPROC
2430DEFPROCINITSET
2440DIM MI(5),HS(9),HN$(9)
2450FOR I=0 TO 9
2460HS(I)=(10-I)*250
2470HN$(I)="Loona Rescue"
2480NEXT
2490ENDPROC
2500DEFPROCTABLE
2510*FX 15 0
2520IF SCORE<HS(9) GOTO 2600
2530FOR Y=5 TO 6:VDU 31,8,Y,141,132,157,134:PRINT "Co
ngratulations  "CHR$156
2540VDU 31,2,Y+5,141,129,157,131:PRINT "your score is
 in the TOP TEN  "CHR$156:NEXT
2550PRINT TAB(6,14)CHR$131"please enter your name"
2560INPUT TAB(9,16)HN$(9)
2570HN$(9)=LEFT$(HN$(9),20):HS(9)=SCORE
2580FOR X=0 TO 9:FOR Y=0 TO 8:IF HS(Y)<HS(Y+1) T=HS(
Y):T$=HN$(Y):HS(Y)=HS(Y+1):HN$(Y)=HN$(Y+1):HS(Y+1)=T:H
N$(Y+1)=T$
2590NEXT,
2600CLS:VDU 10,10,151:PRINT"  *'C3o*'("CHR$150"  pp9_
pp_pp_p),pp_pp_pp"
2610VDU 141,157,151:PRINTCHR$255" *!j"CHR$255" "CHR$2
55CHR$150" 0//!j"CHR$255"&j"CHR$255"*j"CHR$255"""j"CHR
$255",j"CHR$255"b*u!4"
2620VDU 151:PRINT"  wp(qrwp("CHR$150"  ..............
.........j"
2630VDU 31,0,21,132,157,133:PRINTSTRING$(6,".")CHR$13
3"press"CHR$14/"SPACE BAR"CHR$1"%%STRING$(12,".");
2640FOR Y=0 TO 9:VDU 31,5,Y+7,129:PRINT;Y+1;".";TAB(9,
Y+7)CHR$13;HS(Y)TAB(17,Y+7)CHR$130HN$(Y):NEXT
2650VDU 31,25,21:REPEAT UNTIL INKEY-99
2660ENDPROC
2670DEFPROCTITLE
2680FOR Y=0 TO 22:FOR X=1 TO RND(10):VDU 31,RND(40) 1
,Y,46:NEXT,
2690PRINT TAB(8,3)CHR$148CHR$154"pp   p0  p0_C _p _p"
CHR$135TAB(8,4)CHR$148CHR$154"j5  "!""4"!""4"CHR$255"t
5h'""}"CHR$135TAB(0,5)CHR$149CHR$154"j5 4"CHR$255"  5
"CHR$255"  55j5j//"CHR$255CHR$135TAB(8,6)CHR$142CHR$1
5!".-.1""-b ""-b(- ";
2700PRINT"""1.#!/#"CHR$135TAB(6,7)CHR$145CHR$154";<,t
(!,1 (,t ',t!( !, .!"CHR$135TAB(6,8)CHR$149CHR$154"j5
"CHR$255" "CHR$255"+""j5 '"j5 ""j5 ! "CHR$255"+""CHR$
135TAB(6,9)CHR$149CHR$154"j7+( "CHR$255"k  "")j5  j5 j
"CHR$255"k"CHR$135
2710PRINT TAB(6,10)CHR$148CHR$154"j5 "CHR$255" "CHR$2
55" j)  "CHR$255"j5 jj5 j "CHR$255" j"CHR$135TAB(6,11)
CHR$148CHR$154"." ",/,/""-,' +,' -,!(/,/"CHR$135
2720FOR Y=15 TO 20:VDU 31,8,Y,132,157,31,31,1,156,13
:NEXT
2730FOR Y=16 TO 17:VDU 31,10,Y,141,154:PRINT "by Davi
d Griffin   ":NEXT
2740PRINT TAB(10,19)CHR$131"(c) Copyright 1984  "
2750VDU 31,4,24,129,157,131:PRINT " Instructions (Y/N
) ? ...  "CHR$156;:VDU 8,8,8
2760REPEAT UNTIL NOT INKEY0
2770IF INKEY-69 GOTO 2850
2780IF INKEY-86 GOTO 2800
2790VDU 7:GOTO 2760
2800VDU 31,5,24,129,157,131:PRINT " Skill level (1-3)
 ? ...  "CHR$156;:VDU 8,8,8
2810REPEAT VDU 7:A=GET
2820UNTIL A>48 AND A<52
2830SHEET=A-48
2840ENDPROC
2850CLS
2860FOR Y=0 TO 1:VDU 31,2,Y,141,129,157,135:PRINT "LO
ONA RESCUE"CHR$131" instructions  "CHR$156:NEXT
2870FOR Y=3 TO 13:VDU 31,0,Y,134:NEXT
2880VDU 28,1,24,39,4,12
2890PRINT "  Your task is to rescue stranded"''"humano
ids from their evacuated home"''planet.''"  Drop your
landing pod from the''"patrolling mothership, avoiding
 the''"meteors and space mines."''"  Land on one of the
pads, collecting";
2900PRINT " arefugee.''"  Take off again and dock wit
h the''"mothership to save your man."
2910VDU 26,31,10,15,132,157,131:PRINT "keys :  ";CHR$
156
2920VDU 31,8,17,130:PRINT "' < '"CHR$129" move LEFT"
TAB(0,18)CHR$130"' > '"CHR$129" move RIGHT"TAB(4,19)C
HR$130"' SPACE '"CHR$129" to DROP from mothership"TAB
(6,20)CHR$129"to SLOW DECCENT, and to'
2930PRINT TAB(16,21)CHR$129"TAKE OFF again"
2940GOTO 2800
```

TWO OF THE BIGGEST problems with being a lovesick jelly are: you tend to wobble somewhat and your heart's desire always seems to be out of reach.

For this is the plight of our hero Gene who has the grave misfortune of being trapped in a never-ending circle of eight mazes. Oblivious to this fact Gene, aided by you, persists in searching for Ivy the ice cream.

In each of the mazes made up of poisonous thingies you must guide Gene with the joystick — plugged into port 2 — around the mazes avoiding the walls at all costs. This requires careful timing and down to the pixel accuracy of Gene is to succeed.

You can pause the game at any time by pressing the fire button — which stops Gene from wobbling and the tune from playing — and restart it again by pressing the Control key.

The program itself is a 4K byte block of machine code and needs a special hex loader program — figure 1 — to enter it. Type this in carefully and save it before Running it. Should the program crash upon Running you have probably made an error in typing in the data in lines 40 and 50. Once you have got this program up and running you can start on the game proper.

The computer will ask you to enter an option — 1,2 or 3 — type 1 and press Return to start entering the code from figure 2. When entering the code data leave no spaces between the columns of number for example, the first line is entered as

78A9C18D1503A900

and press return. When the = sign appears enter the checksum. Enter the other lines in the same fashion, omitting all spaces.

If you value your sanity and keyboard I recommend that you enter the code in short chunks. This makes the program entry less painful and less prone to errors.

To exit from the entry part of the hex loader program type End, this will return you to the main menu.

To save on tape what you have typed in choose option 3 and insert a tape into the cassette recorder. It is best if you keep the hex loader program and the game itself on different tapes and that you make back up copies as you go along just in case.

To re-load the game for the next entry session or to play the game type:

LOAD"",1,1,

If you still have code to enter load the game code first type New, then load the hex loader program — that is why it is an advantage to have them on different tapes. When you have finished typing it in then save it before running it as there could be an error in the entering of the data and all your hard work lost. To run the game type:

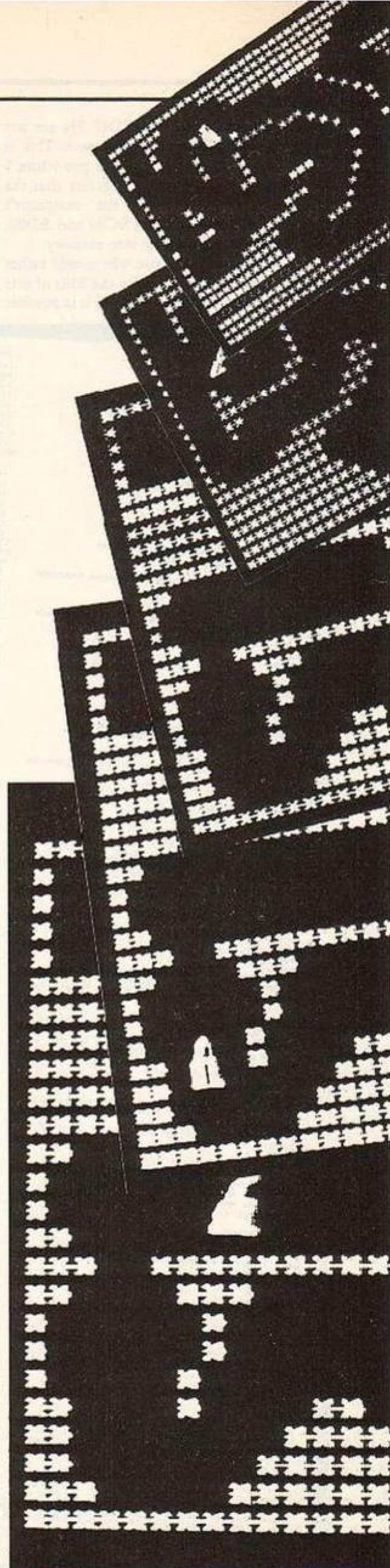
SYS51456

and press Return. Should you be fortunate then it will run straight away. If not then turn

Figure 1. The hex loader.

```
10 REM HEX LOADER/CHECKER/SAVER
25 RESTORE
30 FOR T=828TO859:READA:POKET,A:NEXT
40 DATA169,1,162,1,160,255,32,186,255,159,0,32,189,255,169,192,133,252,169,0
50 DATA133,251,169,251,162,0,160,208,32,216,255,96
60 PRINT "□"
70 PRINT "1 ENTER CODE"
80 PRINT "2 CHECK CODE"
90 PRINT "3 SAVE CODE"
100 PRINT "1,2,3":INPUT A
110 IFA<1ORA>3THEN100
120 IF A=1 THEN 1000
130 IF A=2 THEN 2000
140 SYS828:GOTO10
1000 INPUT "START, FINISH ";A,B
1010 FOR N=A TO B STEP 8
1020 LET SUM=0
1030 PRINT N;" : ";
1040 INPUT A$:IF A$="END" THEN GOTO 10
1060 FOR T=0 TO 7
1070 H$=MID$(A$,1+T*2,2)
1080 GOSUB 3000
1090 SUM=SUM+V
1100 POKE N+T,V
1110 NEXT
1120 INPUT " = ";CS
1130 IF CS<>SUM THEN PRINT "ERROR - PLEASE INPUT AGAIN": GOTO 1020
1140 NEXT
1150 GOTO 10
2000 REM CODE CHECK ROUTINE
2010 INPUT "START, FINISH";A,B
2070 FORT=ATOBSTEP8
2080 D=T:GOSUB4000
2090 PRINTT;": ";
2095 SUM=0
2100 FORS=0TO7:D=PEEK(T+S):SUM=SUM+D:GOSUB4000:PRINTH$;:NEXT
2105 PRINT" = ";SUM:NEXT
2110 GOTO 10
3000 H=ASC(H$)-48:H1=ASC(RIGHT$(H$,1))-48
3010 H=H+7*(H>9):H1=H1-7*(H1>9)
3020 V=H*16+H1:RETURN
4000 H$="":IFD<256THENN=1:GOTO4010
4005 N=3
4010 FORI=NTO0STEP-1
4020 X=D/(16↑I)
4030 IFX<1THENH(I)=0:GOTO4050
4040 H(I)=INT(X):D=D-(H(I)*(16↑I))
4050 IFH(I)>9THEN4080
4060 H$=H$+CHR$(H(I)+48)
4070 GOTO4090
4080 H$=H$+CHR$(H(I)+55)
4090 NEXT
4100 RETURN

READY.
```



JETSET JELLY

Garry Knowles' Gene the Jelly is throwing a wobbler on a CBM-64.

the computer off and on again and re-load the last copy of the game you made and the hex loader program. Run the hex loader and select option 2, enter the start and finish addresses of the code you want to check — these are the four-figure numbers on the left of the hex dump in figure 2.

The computer will now print up a block of memory and you can check it off against the hex dump in figure 2 for any errors. Should you find one make a note of the address on the left and re-enter that line of hex from the hex dump using option 1 of the program. Should you find the task of entering the game too much then send me £3.50 and I will send you a tape of the game and a program which will allow you to enter and design your own mazes. Please make all cheques or postal orders payable to Gary Knowles and send them to: 22 Preston Parade, Seasalter, Whitstable, Kent CT4 4AD.

The program

```
49152 : 78A9C18D1503A900 =  616
49160 : 8D14035 8A90EA219 =  600
49168 : 9D00D4CAD0FFA90F =  1213
49176 : 8D18D4A9090I05D4 =  913
49184 : A9008D06D4A5208D =  870
49192 : 00C0A9090D0CD4A9 =  1040
49200 : 008D0DD4A9100DE9 =  629
49208 : C0A9098D13D4A900 =  511
49216 : 8D14D4A9200I0AC0 =  1045
49224 : A900A2029D00C0CA =  1012
49232 : 10FAA90C8D03C0A9 =  1000
49240 : 000D04C0A9070D05 =  515
49248 : C0A90C0D06C0A900 =  1011
49256 : 8D07C0A9000050260 =  868
49264 : 6060606060606060 =  768
49272 : 6060606060606060 =  768
49280 : 4A4A4A0C0007000E00 =  255
49288 : 20:02042BEEA5502 =  657
49296 : 0103040D0E080502 =  50
49304 : FFEA5542FFA255AA =  1142
49312 : A9030D150 0A9230D =  687
49320 : F807A2008D00CA9D =  565
49328 : 0000BD00C89D0009 =  566
49336 : CAD0F1A920 9D0004 =  1013
49344 : 9D00059D00069D00 =  482
49352 : 07CAD0F1A9008D20 =  1000
49360 : D08D2:D08D3C03A9 =  963
49368 : 038D3D03A9000D40 =  592
49376 : 038D3E03A921 0DF8 =  800
49384 : 07604500FFEA5504 =  750
49392 : CCA0CC80CD00CDA0 =  1074
49400 : CE00CE00CF00CF00 =  1082
49408 : E602A502CD03C0F0 =  1167
49416 : 034C31EAA9000502 =  666
49424 : 05FBA9C605FCA202 =  1300
49432 : BC00C0FE00C0C6FC =  1532
49440 : B1FB305C3C04C00E =  1222
49448 : 97C0AABD00C29900 =  1161
49456 : D49D00C2990:D4AE =  1135
49464 : 07C0BD00C029FE99 =  1292
49472 : 04D4090199 04D4CA =  797
49480 : 10CE4C00C64C00C6 =  770
```

(continued on next page)

(continued from previous page)

```
49488 : 4C00C5DF021DAAFF = 921
49496 : 855AABFA21DAAFF = 1062
49504 : 0E45AAFF0055AAFF = 1084
49512 : 0EC43AFF0015AAFF = 1083
49520 : 0815AABFA055AAFF = 1052
49528 : 0E55AAFF9454FFAA = 1167
49536 : C580D80CBD88C0BC = 1254
49544 : 84C09904D44C47C0 = 1032
49552 : C5F0D3034C47C1C9 = 1193
49560 : FFD003A9009E00C0 = 1117
49568 : 4C47C14029FEC990 = 1038
49576 : D00D63290F0FA09A = 411
49584 : 0F9D00C04C47C169 = 939
49592 : 4629FBC9E0D00769 = 1097
49600 : 4629BF8D03C6004C = 772
49608 : 47C1FFE8564DFFAA = 1320
49616 : 550AFFEA574DFFAA = 1158
49624 : 550FFEAF74EFFAA = 1218
49632 : 5510FFAA550FFFAA = 1036
49640 : 55D5EFAA554DFFAE = 1293
49648 : 554AFFEA594AFFAA = 1272
49656 : 5500FFAAC141AAFF = 1193
49664 : 0101010101010101 = 8
49672 : 0101010102020202 = 12
49680 : 0202020202020203 = 17
49688 : 0303030304040404 = 28
49696 : 0404040405050505 = 37
49704 : 0606070708080909 = 60
49712 : 0A0A0A0A0A0A0A0A = 77
49720 : 0E0D0E0F10111213 = 125
49728 : 1011121314151713 = 158
49736 : 1A1B1D1E20222427 = 233
49744 : 2022242729212E31 = 320
49752 : 3437343D4145494E = 511
49760 : 4145494E52575C62 = 644
49768 : 686E747B808B939C = 1026
49776 : 930B939CA5AFB9C4 = 1294
49784 : D0DCE9F73EFE5500 = 1309
49792 : 061625384A5E7389 = 542
49800 : A0B9D3EF0C2C4D70 = 1040
49808 : 0C2C4D70950CE612 = 830
49816 : 4172A7DE19569AE0 = 1059
49824 : 195B9AE02A75CC24 = 854
49832 : 82E54EBD33BE34C0 = 1097
49840 : 33BE34C055F29949 = 1023
49848 : 04CA9C7B6606001 = 916
49856 : 6660600100AE43193 = 1025
49864 : 099539F6CDCE0102 = 1069
49872 : CDCE010254C56326 = 1030
49880 : 122A72EC9B01A304 = 861
49888 : 9B01A304A892C74C = 1040
49896 : 2455E5D9838E939C = 1140
49904 : 838E939CA5AFB9C4 = 1294
49912 : D0DCE9F76BA80055 = 1271
49920 : 47F0F0F049504B49 = 1092
49928 : 52F052F052544B50 = 965
49936 : 49F049F049504B49 = 927
49944 : 4757565452504B49 = 638
49952 : 47F0F0F049504B49 = 1092
49960 : 52F052F052544B50 = 965
49968 : 49F049F049504B49 = 927
49976 : 4752494B47F0F0F0 = 1092
49984 : 4934545654525256 = 661
49992 : 575B625B5B5959F0 = 876
50000 : 5B51515B59525256 = 683
50008 : 5654565456545654 = 680
50016 : 47F0F0F049504B49 = 1092
50024 : 52F052F052544B50 = 965
50032 : 49F049F049504B49 = 927
50040 : 4757565452504B49 = 638
50048 : 47F0F0F049504B49 = 1092
50056 : 52F052F052544B50 = 965
50064 : 49F049F049504B49 = 927
50072 : 4752494B47F0F0F0 = 1092
50080 : 4934545654525256 = 661
50088 : 575B625B5B5959F0 = 876
50096 : 5B51515B59525256 = 683
50104 : 5654565456545654 = 680
50112 : FF00FF04FD00FF00 = 1022
50120 : FF00FF40FF00FD00 = 1082
50128 : FFFFFF00FF00FF02 = 1277
50136 : FD00FF00FF00FF14 = 1038
50144 : FF00FF00FF00FF00 = 1020
50152 : FF000000FF00FF00 = 765
50160 : FF00FF00FF00FF00 = 1020
50168 : FF00EE2FFF0000FF = 869
50176 : 373B373B32363236 = 436
50184 : 373B373B373B373B = 456
50192 : 3236323632363236 = 416
50200 : 3736363432302B29 = 397
50208 : 373B373B32363236 = 436
50216 : 373B373B373B373B = 456
50224 : 3236323632363236 = 416
50232 : 3736363432F0F0F0 = 985
50240 : 3939393942424242 = 492
50248 : 4747474742424242 = 548
50256 : 3939393942424242 = 492
50264 : 4444444449494949 = 564
50272 : 373B373B32363236 = 436
50280 : 373B373B373B373B = 456
50288 : 3236323632363236 = 416
50296 : 3736363432302B29 = 397
50304 : 373B373B32363236 = 436
50312 : 373B373B373B373B = 456
50320 : 3236323632363236 = 416
50328 : 3736363432F0F0F0 = 985
50336 : 3939393942424242 = 492
50344 : 4747474742424242 = 548
50352 : 3939393942424242 = 492
50360 : 4444444449494949 = 564
50368 : FF00FF04FD00FF00 = 1022
50376 : FF00FF40FF00D500 = 1042
50384 : FFFFFF00FF00FF02 = 1277
50392 : FD00FF00FF00FF14 = 1038
50400 : FF00FF00FF00FF00 = 1020
50408 : FF000000FF00FF00 = 765
50416 : FF00FF00FF00FF00 = 1020
50424 : FF001E2AFF0000FF = 837
50432 : 373B373B32363236 = 436
50440 : 373B373B373B373B = 456
50448 : 3236323632363236 = 416
50456 : 3736363432302B29 = 397
50464 : 373B373B32363236 = 436
50472 : 373B373B373B373B = 456
50480 : 3236323632363236 = 416
50488 : 3736363432F0F0F0 = 985
50496 : 3939393942424242 = 492
50504 : 4747474742424242 = 548
50512 : 3939393942424242 = 492
50520 : 4444444449494949 = 564
50528 : 373B373B32363236 = 436
50536 : 373B373B373B373B = 456
50544 : 3236323632363236 = 416
50552 : 3736363432302B29 = 397
50560 : 373B373B32363236 = 436
50568 : 373B373B373B373B = 456
50576 : 3236323632363236 = 416
50584 : 3736363432F0F0F0 = 985
50592 : 3939393942424242 = 492
50600 : 4747474742424242 = 548
50608 : 3939393942424242 = 492
50616 : 4444444449494949 = 564
50624 : FF00FF04FD00FF00 = 1022
50632 : 10F0034C34C90000 = 588
50640 : 00FF00FF03FF00FF = 1020
50648 : 00FF00FF03FF00FF = 1020
50656 : 00FF00FF03FF00FF = 1020
50664 : 00FF00FF03FF00FF = 1020
50672 : 00FF00FF03FF00FF = 1020
50680 : 00FF00FF00FF00FF = 1020
50688 : FE3AA03AD5A0C294A2 = 620
50696 : C902F0034C01EAAE = 1058
50704 : 3E0330135AEF007CF = 765
50712 : E01FD007E0E0A900 = 1231
50720 : 0D3EA03BFFA074CA1 = 800
50728 : EAAEFE07E0E025D0 = 1364
50736 : 07CACFA9000D3E03 = 786
50744 : 0EF0074C01EA4C01 = 1041
50752 : EAFF00FD02FF00FF = 1252
50760 : 00FF00BF00FF2AFF = 998
50768 : AD00DC4AB001004F = 854
50776 : B001CE4AB001CA4F = 904
50784 : B001EE4AB003200E = 822
50792 : C660FFFF00FF00FF = 1314
50800 : 00FF00FF00FF00FF = 1020
50808 : 00FFE5D500FFFF00 = 1207
50816 : 70A9EF0D1503A931 = 906
50824 : 0D14035BEE20B0AE = 903
50832 : 01DCEFEA4A4A4A0E = 1087
50840 : F370A9C1803150A9 = 1059
50848 : 000D140350A9000D = 562
50856 : 20D06070A90705FE = 1019
50864 : A9F005FDAE3C03BE = 1221
50872 : F0C005FCB3F1C005 = 1572
50880 : FBA07EA207B1FB4A = 1208
50888 : B01/0D41020C4203 = 617
50896 : 0AA0A5209IFD90AA = 1227
50904 : AD4103AC4203ACF5 = 903
50912 : C60D41030C42030A = 754
50920 : A0A92A91FD90AAAE = 1272
50928 : 4103AC4203CA10CF = 734
50936 : A5FD3EE900B002CE = 1091
50944 : FE05F10010BD50A5 = 1230
50952 : 200DF607AE3C030F = 803
50960 : 4AAAB190C0A2009I = 1089
50968 : 00D09100D99D00DF = 965
50976 : 9D00D1CAD0F169A5 = 1292
50984 : 030D15D0A9200D0E = 715
50992 : D0A9420D01D0A902 = 964
51000 : 0D10D0AD1ED0EAEF = 1244
51008 : A9379102D0A9D98I = 1102
51016 : 03D0A92/0JF9A/0E = 912
51024 : AE00D0AC01D02050 = 875
51032 : C6E00FD000A9030E = 951
51040 : 10D04C6EC7E0FFD0 = 1296
51048 : 03A9020D10D0EEDE = 693
51056 : D0C01D060AD1ED0 = 1064
51064 : F0034C00C0AD1ED0 = 939
51072 : AD1FD0F0034C00CE = 1059
51080 : AD1FD04C10C90000 = 713
51088 : 00000000FF00FF00 = 510
51096 : FF00FF00FF00FF00 = 1020
51104 : FF000400FFC1FF00 = 962
51112 : FF00FF000E02FF00 = 781
51120 : 2E00FF00FF00FF00 = 811
51128 : FF00FF00FF00FF00 = 1020
51136 : FF00FF00FF00FF00 = 1020
51144 : FF00FF00FF00FF00 = 1020
51152 : FF00FF00FF00FF00 = 1020
51160 : FF00FF00000000FF00 = 765
51168 : FF00FF00FF00FF00 = 1020
51176 : FF00FF00FF00FF00 = 1020
51184 : FF000022FF00FF0I = 948
51192 : FF000200FF005/FF = 980
51200 : A200A000F0E0000FE = 1174
51208 : 0005FE000AFE000E = 1167
51216 : C900F1080D7EEA904 = 1406
51224 : 9CFEA90095FDA21E = 1128
51232 : A027A52091FD8810 = 950
51240 : FA9E1003A2200000 = 822
51248 : 8800FICA10FAAE48 = 1311
51256 : 0310A5FD69289002 = 736
51264 : E6FE05FDC91009AI = 1478
51272 : 1F00AE1ED3EC3C0C = 951
51280 : EE3C03AD3C03290F = 593
51288 : 8D7C034C09C94C05 = 575
51296 : C9FF00FF00FF00FF = 1221
51304 : 00FF00FF00FF00FF = 1020
51312 : 00FF00FF00FF0073 = 880
51320 : 00FFFFFF00FF2800 = 1060
51328 : A2200E5103A9B985 = 938
51336 : FEA90095FDA21C00 = 1155
51344 : 27EE5203A0520391 = 765
51352 : FD0810FB13A5FD69 = 1203
51360 : 289002E6FE05FDCA = 1259
51368 : 10E5A230A0FF08D0 = 1214
51376 : F10A10095AE5103CA = 1371
51384 : 10C0AD1ED0AD1FD0 = 1039
51392 : 4C09C93C03EE4003 = 654
51400 : 4C09C900FF00FF00 = 796
51408 : FF00FF00FF00FF00 = 1020
51416 : FF00FF00FF00FF00 = 1020
51424 : FF00FF00FF00FF00 = 1020
51432 : FF00FF00FF00FF00 = 1020
51440 : FF00FF00FF00FF00 = 1020
51448 : FF00FF00FF00FF00 = 1020
51456 : 2045C920A0C02000 = 718
51464 : C02027C72030C920 = 775
51472 : A0C62030C74C75C7 = 1072
51480 : A210A00098D0F0CA = 1137
51488 : D0FA4C12C3D0F34C = 1285
51496 : 0FC904D0A0C9031D = 807
51504 : A004C0AE03C0A30A = 1302
51512 : AE56C00D04C00E05 = 1240
51520 : C00C86C060A203A9 = 1085
51528 : 209000049D00059D = 512
51536 : 00037D0007A9019D = 497
51544 : 00D39D00D99D03DA = 965
51552 : 9D00D0CAD0E1A27F = 1300
51560 : BD03C99DA204C400 = 1249
51568 : F7A9068D2ED00021 = 977
51576 : D0AD013C2504D3F9 = 1104
51584 : 6023202020270A0314 = 266
51592 : 130514200F050C0C = 115
51600 : 1027202002192020 = 219
51608 : 070112192000D010F = 123
51616 : 170C0513202020 = 187
51624 : 2020000500C102007 = 144
51632 : 0501052014000520 = 121
51640 : 0A050C0C15200509 = 111
51648 : 0E0420091E192014 = 158
51656 : 0005200903052020 = 126
51664 : 2020200031308010D = 136
51672 : 2C18120513132014 = 173
51680 : 0005200314120C20 = 130
51688 : 00051920140F2013 = 159
51696 : 1401121420203020 = 187
51704 : 2020202020202020 = 256
51712 : 0000000000000000 = 0
51720 : 0000000000000000 = 0
51728 : 0000700000F000000 = 296
51736 : 0C0000460000230O = 245
51744 : 0011000001E00003D = 409
51752 : F000166C000B3600 = 443
51760 : 0590002CI900166 = 590
51768 : C003B3E003FFE0E0 = 1304
51776 : 0000000000000000 = 0
51784 : 0000000000300005 = 136
51792 : C000046000043000 = 344
51800 : 0230000210000118 = 101
51808 : 00037600005900005 = 286
51816 : 9D0002C00E02C000 = 825
51824 : 02C00002C1000166 = 773
51832 : C00366E005FFE0E0 = 1227
51840 : 0003000000200300 = 0
51848 : 0003300002740000 = 172
51856 : E20000E20E00E200 = 678
51864 : 00C20000C20001B8 = 576
51872 : 0003760003660003 = 495
51880 : 660003660036600 = 696
51888 : 0365000366000366 = 571
51896 : 000766C007FFC0C0 = 1075
51904 : 0000000000000000 = 0
51912 : 000000000E01C000 = 193
51920 : 03A0000620000C20 = 245
51928 : 000C4000014000018 = 188
51936 : 00006EC0006D9A000 = 807
51944 : D9A0001134001B340 = 865
51952 : 01B34001B3400366 = 593
51960 : 000766C007FFC0C0 = 1075
51968 : 0000000000000000 = 0
51976 : 0000000000000000 = 0
51984 : 000000000E00001D = 43
51992 : 000031000006200000 = 147
52000 : C40001800000DD000 = 562
52008 : 1FBC00366000CD0 = 693
52016 : 00D9A001B3400366 = 726
52024 : 000/CD0C00/FFC0C0 = 1178
52032 : 00FF00FF00FF00FF = 1020
52040 : 00FF00FF00FF00FF = 1020
52048 : 00FF00FF00FF00FF = 1020
52056 : 00FF00FF00FF00FF = 1020
52064 : 00FF00EF00FF007B = 872
52072 : 00FF00FF00FF00FF = 1020
52080 : 00FF00FF00FF00FF = 1020
52088 : AF0000FF00FF0000 = 685
52096 : FF00FF00FF00FF00 = 1020
52104 : FF00FF00FF00FF00 = 1020
52112 : FF00FF00FF00FF00 = 1020
52120 : FF00FF00FF00FF00 = 1020
52128 : FF00FF00FF00FF00 = 1020
52136 : FF00FF00FF00FF00 = 1020
52144 : FF00FF00FF00EF00 = 1020
52152 : FF00FF00FF00FF03 = 1233
52160 : E00000F000C00787A = 718
52168 : 003C0E001F01000F = 249
52176 : 010007320000C0CA0 = 499
52184 : 0GE0C03303C0C1FF = 798
52192 : 00C091300007E0000 = 393
52200 : 1800001800001900 = 72
52208 : 00190000020000066 = 196
52216 : 0000C30000FF1C0C0 = 537
52224 : FFFFFFFFFF81F3FF = 1902
52232 : C00700C0FE000300 = 904
52240 : 4070000390000300 = 363
52248 : 03FC00307FE3FE0C = 655
52256 : 300F03FF0E100703 = 495
52264 : FF5F083703FFFF00 = 942
52272 : 0FE3FF7F001FE3C0 = 1166
52280 : 01000F33000000C07F = 834
52288 : 8350003OFF030000 = 757
52296 : 0F0007E7FE00000F = 522
52304 : C3810001F81000C0 = 676
52312 : 1FFF81003FE00182 = 833
52320 : 000000001C2180000 = 219
52328 : 01C03C0001E1C07F = 798
52336 : FFFFE1E0FFFFFFE1 = 1349
52344 : FFFFFFFFFF000000 = 1403
52352 : FFFFFFFFFF8E0FFF = 1687
52360 : FFFF8C03FFF81F80 = 1323
52368 : 01FFF00F00400FC0 = 919
52376 : 0789000381839004 = 794
52384 : 0083C1000/C041E1 = 1069
52392 : 0000392DC1000004 = 685
52400 : 104189000200418C = 440
52408 : 180109438FF0C00E = 811
52416 : 41800E0504.0001 = 767
52424 : C108C18093.0061 = 759
52432 : 007E020041C.F004 = 766
52440 : 1041FFE0303041FF = 944
52448 : E07040023FFF00000 = 1026
52456 : 01FFF00001C.FFFC = 1333
52464 : 0003C1FFFFFFFFE1 = 1441
52472 : FFFFFFFFFF000000 = 1403
52480 : FFFFFFFFFF00FFFE = 1306
52488 : FFFF8090F07FFF00 = 1516
52496 : 90603FFF3000601F = 797
52504 : FFFC00600FFFFE18 = 1159
52512 : 6:07FFC1"06.07FF = 1279
52520 : 007061C3FF0000E1 = 1140
52528 : C:FFC001E1E0FF82 = 1475
52536 : 03E1F07F9707E1F0 = 1202
52544 : 3F07FFE1"01FCFFF = 1419
52552 : E:FC0787FE1FE01 = 1354
52560 : 07FFE1FF3197FFE1 = 1486
52568 : FF8183FFE1FFC1E1 = 1572
52576 : C3C1FFF1300101FF = 1509
52584 : F:C00001FFF1E000 = 1154
52592 : 03FFF1F81007FFF1 = 1274
52600 : FFFFFFFFF000000 = 1403
52608 : FFFFFFFFF07FFFC = 1919
52616 : 07FFE7FFC03FFE7 = 1297
52624 : F01001FF07E00420 = 915
52632 : FF07E0021007F8700 = 798
52640 : 0:003F0603C0043F = 620
52648 : 840410843F840000 = 495
52656 : 443FE41000443FE4 = 550
52664 : 1000443F00300044 = 543
52672 : 3F0030904443F0410 = 654
52680 : 00443F821000043F = 728
52688 : 821080043F841841 = 690
52696 : 043F84103E003FC0 = 548
52704 : 1C00107FC01E0030 = 441
52712 : 97E03F007001F0FF = 1038
52720 : FFF901FFFFFFFC21 = 1554
52728 : FFFFFFFFFF090000 = 1403
52736 : FFFFFFFFFF07FFFF = 1920
52744 : FFFF01FFFFC00F00 = 1484
52752 : 7FFF0007003FFE00 = 834
52760 : 03941FC10703060F = 646
52768 : 00AFC307AA0A1FF3 = 609
52776 : 8700003FE307C01F = 919
52784 : FFC387E0GFFFC7CF = 1533
52792 : F43FFFC707F03FF8 = 1455
52800 : 0187F83FC00187F8 = 1023
52808 : 7F00E1CFF8FE03FF = 1095
52816 : 07F0F00F0103E1E0 = 1211
52824 : 1C01E1C1C07801C0 = 856
52832 : 01C0E033E001C7E0 = 1020
52840 : 73E003C000E1F007 = 1006
52848 : E003E1FFFFF00FE1 = 1442
52856 : FFFFFFFFFF0000C0 = 1403
52864 : FFFFFFFFFF800200 = 1413
52872 : 1011E001002021E0 = 363
52880 : 0000404109C04F00 = 809
52888 : 8300830041050000 = 537
52896 : 20222090000C01411 = 448
52904 : 09C001082100000I = 509
52912 : 0441000001020354 = 463
52920 : 04090185FBF3F700 = 896
52928 : 4900000084318000 = 5.0
52936 : 004A11000000003111 = 285
52944 : 87FFF82011021004 = 837
52952 : 001F812002002300 = 357
52960 : C0010041F00201FF = 765
52968 : 8100040000018000 = 542
52976 : 400011801020003I = 314
52984 : FFFFFFFFFF00FF00 = 1658
52992 : FFFFFFFFFFDFFE03 = 1755
53000 : 00C0FFF001001F0F = 749
53008 : E000000F0FC03030 = 686
53016 : 070FC01C7003FFC2 = 958
53024 : 1FF0030F921FF0C7 = 1145
53032 : 0FC70FFF0C3070/0F = 1077
53040 : E0C1070/0FE1E187 = 1159
53048 : 0F07E1E1070-87C1 = 950
53056 : F1060F0/C3F187/1F = 1127
53064 : 03C3F1C01FLC03F1 = 1371
53072 : CC1FC307E1C03FC1 = 1250
53080 : 87C1043FE107C394 = 1082
53088 : 30E10FC3047J700F = 862
53096 : C30000001FC10002 = 677
53104 : 001FE1C007003FF1 = 759
53112 : FFFFFFFFFF03FF00 = 1658
53120 : FFFFFFFFFF0/FFFF = 1920
53128 : FFFF0/E0FFFFFFF7 = 1767
53136 : 833FF03F07030FC0 = 836
53144 : 1FC00F0380000CC1F = 633
53152 : 830/0F043FC01F0F = 586
53160 : 007FE03F0730FFE0 = 1264
53168 : .F07C0FFF3FF5/F0 = 1582
53176 : FFF3FF07F0FFE07F = 1734
53184 : C7F0FFE03FF81F9FF = 1514
53192 : C01F01F5FF041E01 = 851
53200 : FFFF0E1E01FFFE.F = 1365
53208 : 0C01F8FE3F0833F8 = 1313
53216 : 7C3F00/3FC387FC0 = 1357
53224 : E1FC00/FE1C1FC00 = 1309
53232 : FFFFE1FF01FFFFE1 = 1726
53240 : FFFFFFFFFF800000 = 1403
```



How much would you expect to pay for a dual 128K fast access storage system for your Spectrum that included Centronics and RS232 interfaces and free word processing software as standard?

Chances are it's a lot more than £129.95. But this is what will buy you the incredible Rotronics Wafadrive unit. There are no extras - this price includes VAT and postage.



A fast reliable dual-drive storage system

Integrated System

The Wafadrive is a complete system which contains the micro interface, two 128K drives, RS232 and Centronics ports, all in one attractively-styled, compact unit. There is a minimum of connecting leads and no extra boxes to clutter the desk top. Like the majority of professional systems, the units are dual drive. This offers the optimum balance between system flexibility and cost. Built-in serial and parallel interfaces allow the direct connection of just about any popular printer.

Fast and Reliable

The Wafadrive achieves very fast loading and saving, but not at the expense of reliability. Extensive research and the use of high grade materials ensure that the Wafadrive will give years of dependable operation. Data integrity is on a par with floppy disk. The fully interchangeable wafers are available in three sizes - 128K, 64K and 16K. Low capacity wafers give faster access. They are therefore most suitable for program development applications. The high capacity wafers are suitable for more general data storage. Loading rate is well over ten times as fast as cassette!

Software

Armed with the comprehensive user manual, blank wafer and word processor supplied, you can use your Wafadrive straight away. There is also a rapidly growing range of software to enable the programmer and games player to exploit the Wafadrive system to the full.

Wafadrive for the 16/48K Spectrum is available now. Versions for other popular home computers are under development.

Send a 16p stamp for a full colour brochure and information on software and accessories.

FOR USE WITH THE SINCLAIR SPECTRUM

Please send me (enter as appropriate):

____	ROTRONICS Spectrum Wafadrive(s)	@ £129.95 each	____
____	16K wafer(s)	@ £3.45 each	____
____	64K wafer(s)	@ £3.65 each	____
____	128K wafer(s)	@ £3.95 each	____
____	Heathrow/Night Gunner(48K: Hewson)	@ £14.95 each	____
____	Space Wars/Seiddab Attack/Lunar Attack (48K: Hewson)	@ £14.95 each	____
____	Bear Bovver/Wong's Loony Laundry/ World Cup (48K: Artic)	@ £9.95 each	____
____	Starbike (48K: Softek)	@ £7.95 each	____
____	The Artist - graphic utility (48K: Softek)	@ £9.95 each	____
____	ZAP machine code development package (48K: Hewson)	@ £19.95 each	____
____	RS232 lead	@ £9.95 each	____
____	Centronics lead	@ £9.95 each	____
	All prices include VAT and P&P	TOTAL £	____

☐ I enclose a cheque/PO* made payable to SMT
☐ debit my Access/Barclay card* account no.
(*delete as applicable)

Signature: ____

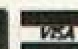
Name: ____

Address: ____

Send to (no stamp required): **SMT, FREEPOST, Greens Norton, Towcester, Northants, NN12 8BR**

Please allow 28 days for delivery.





SMT

BLOCKPAINT

Listing 1.

```
  10 CLEAR 24573: LOAD "block"CO
DE 24574: LOAD "data"CODE 28670
  20 INPUT "Speed? (1-9)=";a: IF
 a<1 OR a>9 THEN GO TO 20
  25 POKE 27954,a
  30 INPUT "Number of lives? (1
to 9)=";a: IF a<1 OR a>9 THEN GO
 TO 30
  40 POKE 24925,a
  50 INPUT "Max. number of enemy
's? (1,2,4)=";a: IF a<>1 AND a<>
2 AND a<>4 THEN GO TO 50
  60 POKE 25308,a-1
 100 LET a=USR 27981
 110 PRINT AT 20,0; FLASH 1;" H
I T   A N Y   K E Y ": PAUSE 0:
GO TO 100
 200 SAVE "BLOCKPAINT" LINE 10:
SAVE "block"CODE 24574,3488: SAV
E "data"CODE 28670,386
 210 GO TO 200
```

Ayal Pinkus presents a colourful Spectrum game.

Listing 2.

```
   5 RESTORE : CLEAR 25799
  10 DEF FN k(x)=CODE "012345678
9000000 (x)=7000000000000000000
00000000 (x)=7 (CODE a$(x)-47)-4
8
  20 READ x: FOR i=1 TO 16: LET
s=0
  30 READ b,a$
  40 IF a$="" THEN GO TO 90
  50 POKE x,16*FN k(1)+FN k(2)
  51 LET s=s+16*FN k(1)+FN k(2)
  60 LET a$=a$(3 TO )
  70 LET x=x+1
  80 GO TO 40
  90 IF s=b THEN NEXT i: STOP
  95 PRINT "error at line";100+i
*10: STOP
 100 DATA 25800
 110 DATA 12958,"0103050913274FF
[illegible]
 120 DATA 10843,"711CA3946622D2F
[illegible]
 130 DATA 6322,"0210071100534[illegible]
[illegible]
 140 DATA 9170,"3E00327A61327B[illegible]
[illegible]
 150 DATA 9590,"0020202020202020
[illegible]
 160 DATA 9578,"3600FFC9DD360000
[illegible]
 170 DATA 9929,"62010500DD7E01FE
[illegible]
 180 DATA 11624,"6F19E5D1DD217F5
[illegible]
 190 DATA 11495,"22DD5E03CB2372[illegible]
[illegible]
 200 DATA 11683,"03CB2781[illegible]
[illegible]
 210 DATA 11977,"0000FFFFFF00FFF
[illegible]
 220 DATA 9657,"09DD71091119660[illegible]
[illegible]
 230 DATA 10005,"23DD3605000D191
[illegible]
 240 DATA 11765,"54180DCB2100581
[illegible]
 250 DATA 14573,"00770C23DD7E01[illegible]
[illegible]
 260 DATA 15921,"10C8C1DDE1FDE1E
[illegible]
```

Listing 3.

```
   5 RESTORE : CLEAR 28799
  10 DEF FN k(x)=CODE "012345678
9000000 (x)=7000000000000000000
00000000 (x)=7 (CODE a$(x)-47)-4
8
  20 READ x
  30 FOR i=1 TO 16: LET s=0: REA
D b,a$
  40 IF a$="" THEN GO TO 90
  50 POKE x,16*FN k(1)+FN k(2)
  51 LET s=s+16*FN k(1)+FN k(2)
  60 LET a$=a$(3 TO )
  70 LET x=x+1
  80 GO TO 40
  90 IF s=b THEN NEXT i: STOP
  95 PRINT "error at line";100+i
*10: STOP
 100 DATA 28800
 110 DATA 15490,"FD2501DD7E00DD7
[illegible]
 120 DATA 14145,"E5CD8169[illegible]7EDD770
[illegible]
 130 DATA 10022,"03683C320C68FD7
[illegible]
 140 DATA 11589,"814F78FD8E00200
[illegible]
 150 DATA 12740,"7E02FE0128CADD7
[illegible]
 160 DATA 12743,"02FE0128CADD7E0
[illegible]
 170 DATA 10172,"FDE1FD7E0032C76
[illegible]
 180 DATA 12070,"0FD9460[illegible]
[illegible]
5FD4E01C0816956237EBA2007FE3FC24
```

THE OBJECT of Blockpaint is to guide your yellow character around the screen filling each block black. You do so by surrounding a block with a white line. After you have filled each block in screen you go to the next screen. After six screens you start again at screen one. There are also some white enemies.

At every new screen the number of enemies are chosen randomly — 1 to 4. However, at the beginning you may alter the maximum number of enemies — 1,2,4 — as well as the speed — 1 to 9 — and number of lives — 1 to 9. If you want to alter them again play the game until your game is over, press Break and Run 20.

To enter the game first type in listing 1 and save it with

SAVE "blockpaint" LINE 10

Then type New and enter listing 2. Save it then run it. If the data is error-free, do the same with listing 3 and listing 4. Now save the code behind listing 1 using:
SAVE "block" CODE 28800,3488:
SAVE "data" CODE 32288,279
Now load listing 1 and play it. ■

Listing 4.

```
   5 RESTORE : CLEAR 28799
  10 DEF FN k(x)=CODE "012345678
9000000000:;<=>?000000000000000000
00000000:;<=>?"(CODE a$(x)-47)-4
8
  20 READ x
  30 FOR i=1 TO 2: LET a=0: READ
 b,a$
  40 IF a$="" THEN GO TO 90
  50 POKE x,16*FN k(1)+FN k(2)
  51 LET a=a+16*FN k(1)+FN k(2)
  60 LET a$=a$(3 TO )
  70 LET x=x+1
  80 GO TO 40
  90 IF a=b THEN NEXT i: STOP
  95 PRINT "error at line";100+i
*10: STOP
 100 DATA 32288
 110 DATA 5695,"FF40040000030336
FF2C0003030C12FF7803000030C24FF78
030C03032DFF3007030000302236FF2401
02030224FF2800040302012FF28010603
021BFF2803080302236FF28010A030224
FF28000C030212FF28050000020536FF
34000A020512FF38020502050 9FF3804
00020512FF38040A"
 120 DATA 3189,"020536FF38090003
02042DFF2C0007020409FF3002020402
09FF3002060402 24FF30020A04022DFF
3002040202 12FF2004040202 36FF2002
08020236FF2004080202120020"
```

```
0051606FE3FCA4366B3E3FBACA4366B3E0
0325B642F321E5AC3"
 190 DATA 11496,"4366DD7E00FE002
02ADD7E01FE002023FD4E000404FD4E0
1CD8169562 37E8A2007FE3FC24866180
6FE3FCA4866E3E3FEACA4266B3E00325B6
42F321E6AC3433503A106FFE00C24AAA7
EFE00283FDD7E01FE0202C2EDD7E02FE0
02027FD4600FD4E010D79FEFF2863CD8
1695604CD81697EEA"
 200 DATA 10473,"200EFE3F2053180
9FE3F2840 3E3F8A20433EFF325B64321
D6A133EDD7E00FE0202FDD7E03FE002
028FD4600FD4E010C079FE202823CD8
1695604CD81697EEA2008FE3F2013180
9FE3F28003E3F8A28033EFF325B64321
D6AFD4600FD4E01FDE13EFF321E64321
D6A217A613A5B54FE"
 210 DATA 13105,"0028727EFE00283
70079FEFFC8CD8169560 4CD81697EBHL
2305CFE3FCA305CDD7E01DD56028AC23
05CFE01CA305CDD7E00DD56038A2005F
E01C2306C3E00C90C0C79FE203EFFC8C
D81695604CD81697EBAC2306CFE3FCA3
06CDD7E00DD56038A206FFE01286DD07
E01DD5602BA2004FE"
 220 DATA 9921,"01205E18C7237EFE
00282A05CD81695623 7EBA204CFE3F28
18DD7E02DD56038A203FFE01280ADD7E
00DD5601BA2004FE01202E18CE0404CD
8169562 37EBA2021FE3F281DDD7E00DD
5601BA2014FE0128 10DD7E02DD56038A
2004FE0120033E00C91E02FE3F200110
3E3FBA2001D7B32"
 230 DATA 9642,"2F6DDD2A7F61DD46
00DD23C5DD4E00CB21DD4602CB20043E
0881 4F3A5B64FE00200E3A7B61FE0028
040C0418030C0D043A6B64B9230060C10
FAC3F6ECDD4E01CB21DD4E03CB20043A
5B64FEFF200E3A7AE1FE0028040C041E
030D0D043A6954B9280 50C10FA18503F
2F6DDD5603 2DD77"
 240 DATA 11558,"05DDEE0620413EF
FDD77050600DD4E062A7C61092 27C61C
CE5DD4E00DD4601CB21CB203E0A814F0
404DD5E02DD56031D15CB23CB22ED430
5E2ED530760E0030200E0CDD0361DDE1C
1110700DD1505C24A6CDD48652A7C61E
C5B35E2AFED52FA166D2A7C6122B562D
C2A7FE1DD42000D23"
 250 DATA 15214,"3EFF110700DD8E0
5C0DD1910F23E01C9020206097610FD
5BFE0F0E0EEBFEFE0E0EAF4F2BFEFF1E
EE0F4E2F3BFC9F3CD9E60CD4E613E003
2B732CDCC62CD336SCDA161CD4963CDA
9633E0321D6A321E6A2A7C511110274A
FED32F270601922 7C61CD3732CDF465C
CD439FE0128CCC032"
 260 DATA 4615,"64FE0128C8FE0AFA
C8CD316DF318D2090000020520183C04
0902062D0040010002060900400000902
06091C400006050024134802030020312
00230209002031210282201020236002 0
0203020236032005000300040120FF3C01
0002041BFF30010404070 9FF58000B02
0413FF3002060 40424"
```

For the price of ten aliens you ca
communicate with far friendlie





Imagine the benefits of being able to communicate with other computer users.

Of letting your computer save money on new software as well as helping improve your programming skills.

And wouldn't you be better informed if your computer kept you up to date with new developments in the computer world.

Just a few of the ways in which our Modem helps a Commodore 64 become more useful to you.

Fitted in seconds.

Our Modem is as easy to fit as it is to use. One end slots into your Commodore 64's cartridge port the other plugs into your telephone line.*

Computer Pals.

Once you've installed a Modem you can communicate with all other Commodore 64 Modem owners.

You can leave messages on bulletin boards, sell and swap programs.

You could work together on programs. Discuss recent software releases. And even play chess.

Now you see it.

You'll be able to see page after page of information from existing systems like Prestel, Micronet† and the exciting new system called Compunet.

ın now r beings.

Compunet it's new and unique.

At present Compunet's exclusively for Commodore 64 Modem owners.

It's the most advanced communications system designed for home computer users.

At last you can work hand-in-hand with a giant mainframe.

Because you can send and receive information. This increased interactivity brings the capacity of large computers into your home.

Software galore.

And a lot of it's free. Free games, free education, free information.

Free from hassle too.

Because you can now select software from Compunet then save it on to cassette or disk.

What's more, highly prized software from leading companies is on offer, thanks to our Modem's built in security systems.

You'll also be able to pick up useful hints and tips to improve programming skills.



Free tuition.

Now your computer can make a serious contribution to your children's education.

Already Compunet has over 50 free educational packages, with subjects ranging from elementary maths to A-level Physics. And there's up to 10 new packages every month.

Our Modem delivers the goods.

You can already shop via Compunet and make great savings by joining Comp-u-card.

Before long, you will be able to view new property lists, order groceries, organise your banking and even request insurance quotes.

All in addition to a wide range of services currently available through other systems.

Free for all.

If you order a Modem now you will receive one year's free subscription to Compunet.

Representing a saving of £30.

Add to this the reductions you can get on many purchases through Compunet and you can see the obvious values of owning a Modem.

What price the world at your fingertips?

A Modem costs much the same as 10 aliens. Or, to be precise £99.99.

Which is money well spent, because a Modem continually revitalises your computer. Making the Commodore 64 a home computer that should never lose its appeal.

You may find our Modem in the shops, if you're very quick.

Alternatively you can avoid disappointment and buy direct from Commodore. Simply complete the coupon, then we'll send you a Modem, plus your year's free subscription to Compunet.

commodore

Commodore Communications Modem,
1 Hunters Road, Weldon, Corby,
Northamptonshire NN17 1QX.



Please send me a Commodore 64 Communications Modem plus a year's free subscription to Compunet (worth £30).

I am enclosing a cheque/postal order for £99.99 (incl. VAT and P&P.) made payable to Vicsoft ☐
I would like my Visa/Access card debited. ☐

No. ______

Signature ______

Or please send me further information. ☐

Name Mr/Mrs/Miss ______

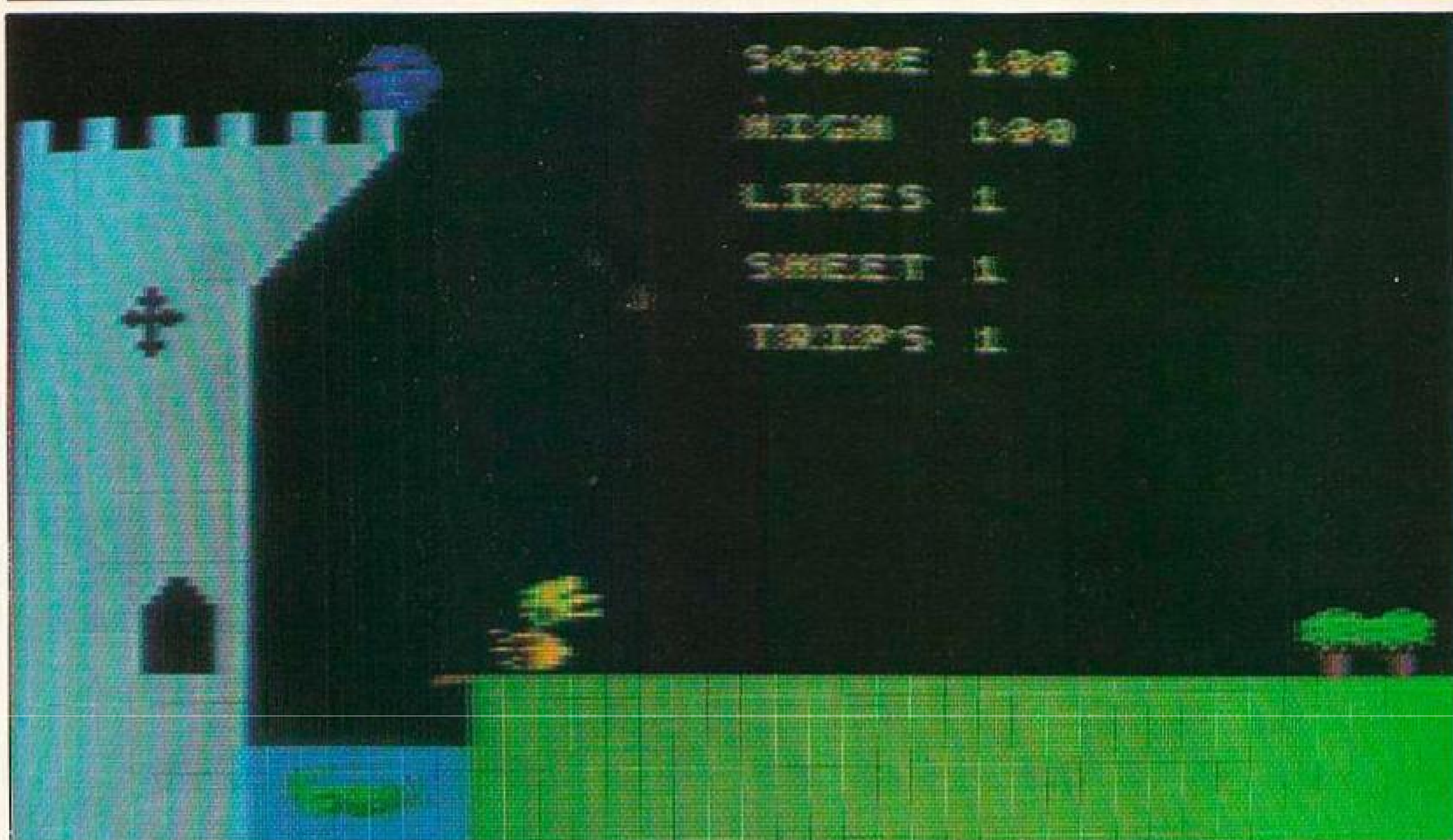
Address ______

______ PostCode ______

Registration subject to Compunet's terms and conditions. Allow 28 days for delivery.
Post to: Commodore Communications Modem,
1 Hunters Road, Weldon, Corby, Northamptonshire NN17 1QX.

*A new-style B.T. socket is required.
†Prestel and Micronet require additional subscriber charges.

Prestel is a registered Trademark of British Telecommunications.
Micronet is a project of British Telecom – Prestel and Telemap Ltd.



KING OF THE CASTLE

Barry Prescott shows you how to reclaim the throne of Olde England.

KING OF THE CASTLE is a 16K Atari game that will work on the old 400 and 800 machines and the new 600XL. It will not work on the 800XL. It uses Antic mode 4 (Graphics 12), a vertical blank interrupt routine and various machine-code routines, including Stan Ockers' Load Player Routine to give a fast, challenging and enjoyable game in Atari Basic.

The Kingdom has been taken over by Drego the Dragon-Master who has thrown you, the rightful King, out of your castle. You must collect wood from the forest — on the right of the screen — and run into the castle where you build over the moat — which is defended by a docile alligator. You will need six logs to complete the bridge.

Meanwhile Drego is commanding the wicked dragon, Grotbags, to spit deadly fireballs at you and an archer to pick you off with arrows.

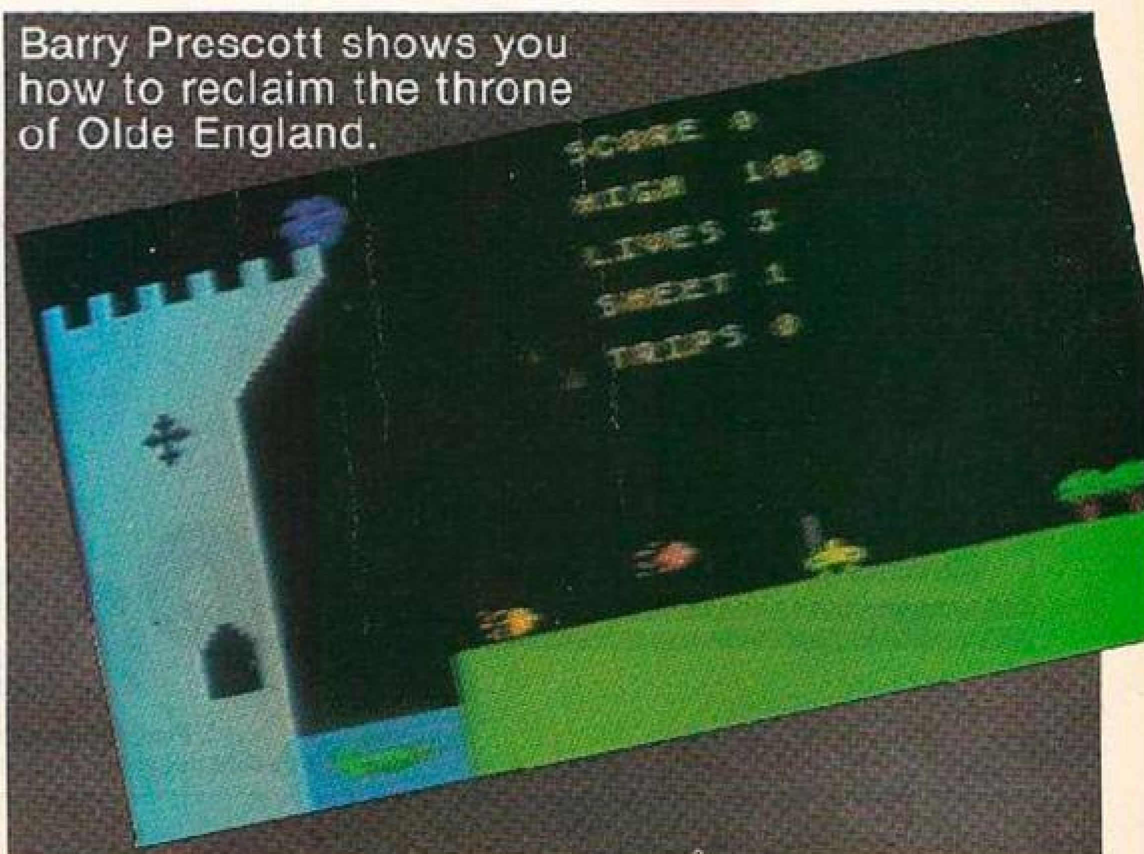
The joystick moves you left and right and the button makes you jump. If you pull down on the joystick you can duck down underneath the red fireball or the arrow.

The program is in two parts to save memory and speed and to print a display on the screen while the main program is loading,

Type in the first program taking great care with lines 11000-11010 and lines 11500-14050. Do not type in line 15000 yet. Now Run the program and then enter the following line:

```
P=O.FOR F=1536 TO
  1555:P=P+PEEK(F):NEXT F ? P
```

(continued on page 91)



(continued from page 89)

The computer should respond with 2372. If not then you have an error in lines 11000-11010. Then try this:

P = O:FOR F = 1580 TO
   1716:P = P + PEEK(F):NEXT F:? P

This time it should be 13454. If not then there is an error in lines 14000-14050. To check lines 11500 and 11510 try:

P = O:FOR F = PM + 200 TO
   PM + 222:P = P + PEEK(F):NEXT F:? P

The answer should be 1571. Now you can enter line 15000 and CSave the first program.

Type New and type in the second program taking care with lines 13000-13030. CSave this directly after the first program. Now you can run it. If a crash occurs then you have probably made a mistake in some machine code data or a USR call.

Switch off and then on with Basic installed and type CLoad. When the first program has loaded, type Run and wait for a few minutes for the second program to load. Then you can Run it and play the game!

First program: Lines 10-130 print the instructions on the screen to read while the main program is loading.

Lines 10000-10270 redefine the character set. Antic mode 4 is a multi-colour text mode. The characters are worked out as follows:

PIXEL:-	3	2	1	0	
COLOR0	0	0	0	0	(black)
COLOR1	64	16	4	1	(red/orange)
COLOR2	128	32	8	2	(yellow)
COLOR3	192	48	12	3	(blue)

Color4 — normally purple — is achieved by printing the inverse of your character. Color3 will appear as Color4 for example, if you wanted Color2, Color1, Color3, Color0 as the top line of your character then you would add up:

128 + 16 + 12 + 0 = 156

156 would be the first digit in your Data line.

Lines 11000-11010 are to insert and remove the VBI during the program.

Lines 11020-11130 put the various player images into memory underneath the actual visually-displayed P/M areas. These are not multi-coloured but simple 8 bit representations. I have used single line resolution for the players and missiles so each pixel is half as tall as it is wide.

Lines 11500-11510 Poke in a machine-code routine to move the arrow.

Lines 14000-14050 Poke the vertical blank interrupt routine onto page 6. This routine will be executed every 50th of a second while the television's electron beam is returning to the top of the screen.

Line 15000 CLoads the second program without you have to press a key.

Line 0 finds the place in memory where program 1 stored the player data. Lines 1-5 ask you for the difficulty level. Anything other than level 1 is almost impossible! Line 10 sends the program to the initialisation.

Lines 100-150 is the "moat" subroutine. Line 100 stops the VBI and checks if you are carrying the log. Line 110 is executed if you are carrying the log. It lays down the log and increases your score by 100. Line 115 checks if you have put down six logs. If you have then your score is increased by 1000, Greensleeves is played (20000), the bridge is wiped off and the program begins again. Line 120 is executed if you have fallen off the end and decreases your lives by one.

Lines 130-135 reset all players back to their original places, set the jump direction and jump counter back to zero and print the score (27000). Line 140 checks if you have any lives left and if so prints the king and returns to the main routine.

Lines 300-360 are the king hit routine. Line 300 stops the VBI and flashes the king. Lines 305-307 reset the players, decrement your lives and display the score. If you have any lives, line 311 returns you to the main routine. Lines 320-340 display the 'game over' message. Lines 350-360 wait for you to press your button before starting the game again.

Lines 500-550 are the jump subroutine. Line 500 moves you up if appropriate and line 510 moves you down. Line 520 decreases the jump counter and checks if you have reached the end of your jump. If so then the normal king is displayed. Line 530 displays the king jumping right. Line 540 displays the king jumping left.

Line 9000 initialises some commonly used constants as variables to save memory.

Lines 13000-15030 put the load player routine into a string called LD$. LD is set to the address of this string.

Lines 15000-15030 Poke the data for the VBI and load player routine onto page 6.

1556-1559 Horizontal positions
1560-1563 Vertical positions

(continued on page 93)

Program 1.

```
10 GRAPHICS 0:POKE 710,0:POKE 752,1:POSITION 10,0:? "King of the Castle":POSITIO
N 10,1
20 ? "":POSITION 2,2
30 ? " The Kingdom has been taken over by   Drago the Dragon Master who has thro
wnyou, the rightful King out";
40 ? " of your    castle. Your object is to reclaim the throne of Olde England f
rom the evil  hands of dastardly";
50 ? " Drago."
60 ? " You must collect wood from the forestin the east, and run to the castle"
70 ? "where you build a bridge over the moat(defended by a docile alligator.)"
80 ? " You will need six logs to complete   the bridge.";? " Meanwhile Drego is
commanding the    wicked ";
90 ? "dragon, Grotbags to spit deadlyfireballs at you, and an archer to    pick
you off with arrows."
100 ? "CONTROLS:-":? "STICK LEFT -KING LEFT":? "STICK RIGHT-KING RIGHT"
110 ? "STICK DOWN -KING CROUCHES"
120 ? "BUTTON     -KING JUMPS"
130 ? "         LOADING MAIN PROGRAM";
9999 REM **NEW CHAR SET**
10000 P=PEEK(106)-8:N=P*256
10010 FOR F=0 TO 1024:POKE F+N,PEEK(57344+F):NEXT F
10020 FOR F=776 TO 975:READ D:POKE F+N,D:NEXT F
10030 DATA 255,255,255,255,255,255,255,255
10040 DATA 255,255,252,252,240,240,192,192
10050 DATA 255,255,63,63,15,15,3,3
10060 DATA 255,255,252,252,255,243,192,192
10070 DATA 63,63,15,15,63,51,0,0
10080 DATA 243,255,255,255,252,252,255,255
10090 DATA 51,63,63,63,15,15,63,63
10100 DATA 85,85,0.0,0,0,0,0
10110 DATA 170,170.170,170,170,170,170,170
10120 DATA 16,7,7,43,5,5,5,255
10130 DATA 48,48,12,204,12,3,3,255
10140 DATA 207,63,15,15,15,12,12,12
10150 DATA 3,3,3,12,204,204,240,240
10160 DATA 255,255,255,255,255,250,234,235
10170 DATA 255,255.255,255,170,191,255,255
10180 DATA 255,255,255,255,175,255,255,255
10190 DATA 255,255.255,255.255.255.255.251
10200 DATA 234,234,234,250,250,254,254,255
10210 DATA 254,170,170,10,162,162,138,175
10220 DATA 174,168,170,170,138,40,35,42
10230 DATA 235,175,191,86,170,191,255,255
10240 DATA 2,10,42,170,170,138,170,162
10250 DATA 24,134,4,33,1,1,1,1
10260 DATA 128.40,168,170,42,168,138,168
10270 DATA 70,16,64,64,64,64,64,64
10999 REM **VBI inserter & remover**
11000 FOR F=1536 TO 1555:READ D:POKE F,D:NEXT F
11010 DATA 104,160,44,162,6,169,7,76,92,228,104,160,98,162,228,169,7,76,92,228
11020 P=PEEK(106)-24:PM=P*256
11029 REM **PLAYER IMAGES**
11030 FOR F=PM TO PM+137:READ D:POKE F,D:NEXT F
11040 DATA 48,48,60,30,31,30,61,93,25,56,40,46,34,34,96,0
11050 DATA 48,48,60,30,30,95,62,28,24,56,112,80,80,40,20,52,0
11060 DATA 48,60,62,31,158,127,29,152,249,10,4,0
11070 DATA 24,24,24,126,255,109,255,66.36,102,0
11080 DATA 12,12,60,120,248,120,188,186,152,28,20,116,68,68,6,0
11090 DATA 12,12,60,120,248,250,124,56.24,28,14,10,10,20,40,44,0
11100 DATA 12,60,124,248,119,254,184,25,159,80,32,0
11110 DATA 128,52,78,14,223,15,46,78,44,0
11120 DATA 32,4,206,14,31,159,78.14.148,0
11130 DATA 64,64,160,160,96,96,16,16,8.8,5,5.3,3,7,7,0
11499 REM **ARROW MOVEMENT**
11500 FOR F=PM+200 TO PM+222:READ D:POKE F,D:NEXT F
11510 DATA 104,173,23,6,24,105,3.141,23,6,141,3,208,173,27,6,24,105,6,141,27,6,96
13999 REM **VBI**
14000 FOR F=1580 TO 1716:READ D:POKE F,D:NEXT F
14005 DATA 216,165,20,41,1.240,3,76,98,223
14010 DATA 173.21,6,24,109.41.6,141,21,6,173,22,6,24,109,42,6.141,22,6,201,200,1
44,5,162,50
14020 DATA 142,22,6,24,173.21.6,201,200,144,5,162,30,142,21,6.166,206,240,17,224
,11,208,3,206,20,6,224,7,208
14030 DATA 3,238,20,6,24,144,17,174,120,2,224,11,208,3,206,20.6,224,7,208,3,238,
20,5,173,20,6,141,0,208,173,2.
14040 DATA 6,141,1,208,173.22.6,141,2,208,165,204,240,6.173,20,6,141,5,203
14050 DATA 173,132,2,208,2,230,208,173,12,208,240,4,169.1,133,207,76,98,228
15000 POKE 764,12:CLOAD
```

(continued from page 91)

1564-1567 Not used
1568-1571 Low byte player area
1572-1575 High byte player area
1576-1579 Speed

Lines 16000-16190 print the main game scenery on the screen. The Pokes in line 16000 disable the Break key. Line 16005 turns off the display, finds the start of the display list, sets the left margin to zero and turns off the cursor. Line 16010 changes the graphics 0 display to Antic mode 4.

Line 16020 sets the colours. Lines 16030-16060 print the castle on the screen. The next line draws the green field. Line 16090 displays the alligator in the moat. Line 16100 puts a door in the castle. Line 16110 prints the forest on the right of the screen. Lines 16120-16190 puts all the P/M lines on the screen.

Lines 17000-19060 is the main game routine. Line 17000 initialises the score, lives, trips and sheet number. Line 17025 starts the VBI to work. Line 17030 clears collisions and stops the "attract" mode. Line 17040 animates the fireballs. Line 17050 gives the king a log if he is in the forest. The next line checks if the king has run off the screen. Line 17080 checks if the king has run up to the moat, and if so it goes to the subroutine at line 100. Line 17090 checks for collisions with fireballs. Lines 17100-18000 move and animate the king. Lines 19000 and 19010 move the arrow.

Lines 20000-20130 are executed when the king has completed the bridge. Note that £ denotes a hash symbol.

(Program 2 on page 95)

```
Insert VBI
1536 PLA        (disregard)
1537 LDY £44    low byte
1539 LDX £6     high byte
1541 LDA £7     deferred
1543 JMP 58460 insert VBI

Remove VBI
1546 PLA        (disregard)
1547 LDY £98    low byte of XITVBI in the
  OS
1549 LDX £228   high byte
1551 LDA £7
1553 JMP 58460 remove VBI

VBI start
1580 CLD
1581 LDA 20     jiffy timer
1583 AND £1     get the first bit
1585 BEQ 1590   if even number then
  continue
1587 JMP 58466 odd so back to Basic
1590 LDA 1557   x coordinate of player 1
  (red fireball)
1593 CLC
1594 ADC 1577   add speed 1
1597 STA 1557   store it.
1600 LDA 1558   x coordinate of yellow
  fireball
1603 CLC
1604 ADC 1578   speed 2
1607 STA 1558   store it.
1610 CMP £200   off screen?
1612 BCC 1619   if not then branch
1614 LDX £50    yes, back to left
1616 STX 1558
1619 CLC
1620 LDA 1557   player 1
1623 CMP £200   off screen?
1625 BCC 1632   if not then branch
1627 LDX £30    left of screen
1629 STX 1557   store it.
1632 LDX 206    jumping?
1634 BEQ 1653   if not then branch
1636 CPX £11    stick left when button
  was pressed?
1638 BNE 1643
1640 DEC 1556   jump left
1643 CPX £7     stick right when button
  was pressed?
1645 BNE 1650
1647 INC 1556   jump right
1650 CLC
1651 BCC 1670   force a branch
1653 LDX 632    stick 0 location
1656 CPX £11    left?
1658 BNE 1663
1660 DEC 1556   run left
1663 CPX £7     right?
1665 BNE 1670
1667 INC 1556   run right
1670 LDA 1556   x coordinate of King
1673 STA 53248 player 0 horizontal
  position
1676 LDA 1557   x coordinate of red fireball
1679 STA 53249 player 1 horizontal
  position
1682 LDA 1558   x coordinate of yellow
  fireball
1685 STA 53250 player 2 horizontal
  position
1688 LDA 204    got a log?
1690 BEQ 1698
1692 LDA 1556   yes!
1695 STA 53253 put missile 1 on King
1698 LDA 644    strig 0
1701 BNE 1705   if not pressed then
  branch
1703 INC 208    pressed
1705 LDA 53260 player 0 to player
  collissions
1708 BEQ 1714
1710 LDA £1
1712 STA 207    if hit then put a 1 in 207
1714 JMP 58466 back to Basic
```

King of the Castle Program 2.

```
0 P=PEEK(106)-24:PM=P*256
1 ? CHR$(125):? :?           KING OF THE CASTLE ":? "by BARRY PRESCOTT 10/11/83"
2 ? :? " 'SHIFT' pauses and restarts the game and also aborts ";
3 ? "'GREENSLEEVES' when a sheet has been completed."
5 TRAP 5:? :? "DIFFICULTY(1 TO 5)";:INPUT DIF:IF DIF<1 OR DIF>5 THEN 5
10 TRAP 40000:GOTO 9000
100 A=USR(1546):IF PEEK(204)=NO THEN 119
110 MOAT=MOAT-4:TRIPS=TRIPS+N1:POKE 204,NO:POKE 53253,NO:POKE (SP+765)-TRIPS,104
:SC=SC+N100:GOSUB 27000
115 IF TRIPS=6 THEN POKE 1556,182:TRIPS=NO:SC=SC+1000:GOSUB 20000:POSITION 7,18:
? "        ";GOSUB 27000:GOTO 17010
116 GOTO 17025
119 IF PEEK(1556)>MOAT-2 THEN 17025
120 FOR F=156 TO 196:SOUND NO,F,10,10:POKE 1560,F:A=USR(LD,NO,PM):NEXT F:SOUND N
O,NO,NO,NO:LI=LI-N1
130 FOR F=N1 TO N256:NEXT F:POKE 1560,160:POKE 1556,182:POKE 203,NO:POKE 206,NO:
GOSUB 27000
135 POKE 1557,NO:POKE 1558,NO:POKE 53249,NO:POKE 53250,NO:POKE 53248,182
140 IF LI>NO THEN A=USR(LD,NO,PM):GOTO 17025
150 GOTO 320
300 A=USR(1546):FOR F=N1 TO 30:POKE 704,PEEK(53770):SOUND NO,PEEK(53770),8,15:NE
XT F:SOUND NO,NO,NO,NO
305 POKE 53248,182:POKE 203,NO:POKE 205,NO:POKE 206,NO:IF PEEK(204) THEN POKE 53
252,182
307 POKE 1557,NO:POKE 1558,NO
310 POKE 704,200:LI=LI-N1:POKE 1556,182:POKE 53249,NO:POKE 53250,NO:POKE 1560 16
0:GOSUB 27000
311 A=USR(LD,NO,PM):IF LI>NO THEN 17025
320 POSITION 10,10:? "GAME OVER"
330 POSITION 9,12:? "PRESS BUTTON"
340 POSITION 11,14:? "TO START"
350 IF STRIG(NO) THEN 350
355 POKE 559,0:FOR F=53240 TO 53255:POKE F,NO:NEXT F
360 GOTO 15000
500 IF PEEK(203)>N3 THEN POKE 1560,PEEK(1560)-N3
510 IF PEEK(203)<N3 THEN POKE 1560,PEEK(1560)+N3
520 POKE 203,PEEK(203)-N1:IF PEEK(203)=NO THEN A=USR(LD,NO,PM-56*(PEEK(206)=7)):
POKE 206,NO
530 IF PEEK(206)=7 THEN A=USR(LD,NO,PM+89)
540 IF PEEK(206)>7 THEN A=USR(LD,NO,PM+33)
550 RETURN
9000 NO=0:N1=1:N2=2:N3=3:N256=256:N100=100
12999 REM **LOAD PLAYER ROUTINE**
13000 DIM LD$(73):FOR F=N1 TO 73:READ D:LD$(F)=CHR$(D):NEXT F:LD=ADR(LD$)
13010 DATA 234,234,234,104,104,104,170,189,32,6,133,186,189,35,6,133,187,104,133
,213,104,133,212
13020 DATA 189,24,6,133,195,169,0,168,192,255,176,35,196,195,240,3,145,186,200,2
08,243,162,0,161,212,240,11
13030 DATA 145,186,230,212,200,192,255,176,11,208,241,169,0,145,126,200,192,255,
144,249,96,234,234
14999 REM **PAGE 6 DATA**
15000 RESTORE 15010:FOR F=1556 TO 1579:READ D:POKE F,D:NEXT F
15010 DATA 182,30,50,70,160,156,166,36,0,0,0,0,0,0,0,0,0,0,0,0,2,2,2,0
15020 FOR F=4 TO 7:POKE 1568+F,P+F:NEXT F
15030 POKE 1577,DIF:POKE 1578,DIF+N1
15999 REM **SCENERY**
16000 GRAPHICS 0:POKE 16,64:POKE 53774,64
16005 POKE 559,0:SP=PEEK(560)+PEEK(561)*N256:POKE 82,NO:POKE 752,N1:POKE 203,NO:
POKE 205,NO:POKE 206,NO
16010 POKE SP+N3,68:FOR F=6 TO 28:POKE SP+F,4:NEXT F:POKE 756,PEEK(106)-8
16020 POKE 708,52:POKE 709,100:POKE 710,0:POKE 711,140:POKE 207,NO
16030 ? CHR$(125):POSITION 10,NO:? "ji":POSITION 10,N1:? "jm'+ef" (INVERSE)
16040 ? "a a a a a a":? "aaaaiaaaaab":? "aaaaaaaaab":? "caaaaaaat":? "aaaaaaab"
16050 ? "aaadeaa":? "aaafgaa"
16060 FOR F=9 TO 22:? "aaaaaaa":NEXT F
16070 COLOR 105:PLOT 39,22:DRAWTO 39,18:DRAWTO 13,18:POSITION 13,22:POKE 765,105
:XIO 18,#6,NO,NO,"S:"
16080 REM line 16090 is inverse
16090 POSITION 7,20:? "anopqs":POSITION 7,21:? "arstea":POSITION 7,22:? "aaaaaa"
16100 POSITION 4,15:? "bc":POSITION 4,16:? "  ":POSITION 4,17:? "  ":POSITION 35
,22:? "i";
16110 POSITION 35,16:? "vwvx":POSITION 35,17:? "wyny"
16130 POKE 54279,P:POKE 704,200:POKE 705,54:POKE 706,248:POKE 707,18:POKE 559,62
:POKE 53277,N3:POKE 623,4
16140 POKE 53248,182:A=USR(LD,NO,PM)
16150 POKE 53249,30:A=USR(LD,N1,PM+101)
16160 POKE 53250,50:A=USR(LD,N2,PM+111)
16170 POKE 53251,90:A=USR(LD,N3,PM+171)
16180 FOR F=157 TO 169:POKE PM+768+F,4:NEXT F
16190 POKE 559,62
17000 SC=NO:LI=4:TRIPS=NO:SHEET=NO:MOAT=97
17010 SHEET=SHEET+N1:GOSUB 27000
17025 A=USR(1536+(FI*10))
17030 POKE 53278,NO:POKE 208,NO:POKE 77,NO
17040 FI=212-FI:A=USR(LD,N1,PM+FI):A=USR(LD,N2,PM+(212-FI))
17050 IF PEEK(1556)>181 THEN POKE 204,N1
17070 IF PEEK(1556)>190 THEN POKE 1556,190
17080 IF PEEK(1556)<MOAT THEN GOTO N100
17090 HIT=PEEK(53260):IF HIT>NO THEN 300
17100 Y=PEEK(208):ST=STICK(NO)
17110 IF Y>NO AND PEEK(203)=NO THEN POKE 206,ST:POKE 203,5:POKE 205,N2:POKE 208,
NO:IF ST=7 THEN POKE 205,4
17120 IF PEEK(203) THEN GOSUB 500:GOTO 19000
17122 IF ST>.5 THEN 17190
17125 IF ST<.5 THEN SOUND NO,70,12,6
17130 IF ST=11 AND PEEK(205)=NO THEN POKE 205,N1:A=USR(LD,NO,PM-16):GOTO 19000
17140 IF ST=11 AND PEEK(205)=N1 THEN POKE 205,NO:A=USR(LD,NO,PM):GOTO 19000
17150 IF ST=7 AND PEEK(205)=4 THEN POKE 205,5:A=USR(LD,NO,PM+72):GOTO 19000
17160 IF ST=7 AND PEEK(205)=5 THEN POKE 205,4:A=USR(LD,NO,PM+56):GOTO 19000
17170 IF ST=11 THEN POKE 205,N1
17180 IF ST=7 THEN POKE 205,5
17190 SOUND 0,0,0,0
18000 IF ST=13 THEN POKE 205,N3:POKE 1560,166:A=USR(LP,NO,PM+45):POKE 1560,160
19000 SOUND NO,NO,NO,NO:A=USR(PM+200):A=USR(LD,N3,PM+121)
19010 IF PEEK(1563)>160 THEN POKE 1563,36:POKE 1559,90
19020 IF PEEK(53775)<>247 THEN 17030
19030 A=USR(1548)
19040 IF PEEK(53775)=247 THEN 19040
19050 IF PEEK(53775)<>247 THEN 19050
19060 GOTO 17025
19999 REM **GREEN SLEEVES**
20000 RESTORE 20010:POKE 1560,160:A=USR(LD,NO,PM):FOR F=MOAT TO 50 STEP -0.5:POK
E 53248,F:NEXT F:MOAT=97
20001 FOR F=203 TO 206:POKE F,NO:NEXT F:POKE 1557,NO:POKE 1558,NO:LI=LI+N1
20010 DATA 144,50,171,100,108,50,96,75,91,25,96,50,108,100,128,50,162,75,144,25,
120,50
20020 DATA 171,100,144,50,144,75,167,25,144,50,128,100,162,50,193,100
20030 DATA 144,50,171,100,108,50,96,75,91,25,96,50,108,100,128,50,162,75,144,25,
128,50
20040 DATA 121,50,128,50,144,50,153,50,173,50,153,50,144,150,144,100
20100 FOR F=N1 TO 39
20110 READ A,B:SOUND NO,A,10,10:SOUND N1,A+2,10,14:FOR W=N1 TO B*0.8:NEXT W:SOUN
D NO,NO,NO,NO:SOUND N1,NO,NO,NO
20115 IF PEEK(53775)=247 THEN POP :RETURN
20120 NEXT F
20130 RETURN
26999 REM ** DISPLAY SCORE etc **
27000 POSITION 30,NO:? "SCORE ";SC
27005 IF SC>HI THEN HI=SC
27010 POSITION 30,N1:? "HIGH  ";HI
27020 POSITION 30,4:? "LIVES ";LI
27030 POSITION 30,6:? "SHEET ";SHEET
27040 POSITION 30,8:? "TRIPS ";TRIPS
27050 RETURN
```



Will you be the first Earthling to win a pla

Acornsoft are issuing a nationwide challenge to all Acorn Electron and BBC Micro users.

It's the challenge to join a new and exclusive group of computer games players: The Elite.

With 3-dimensional graphics, Elite is a game which is light years ahead of any other.

It strictly defines the rank of each and every player.

As your prowess improves, you move into higher ranks.

But make no mistake, to reach the top rank, your performance must become exceptional.

Then, and only then, will you qualify to call yourself a member of The Elite.

From harmless, you must become lethal.

In Elite, all players start as equals.

With the initial rank of "Harmless," you will embark upon an experience unlike any that you have known before.

You will be a space trader who roams the universe, making your living from buying and selling the cargo in your Cobra space craft.

On your travels, you will encounter aggressors who are eager to put an end to your dealings.

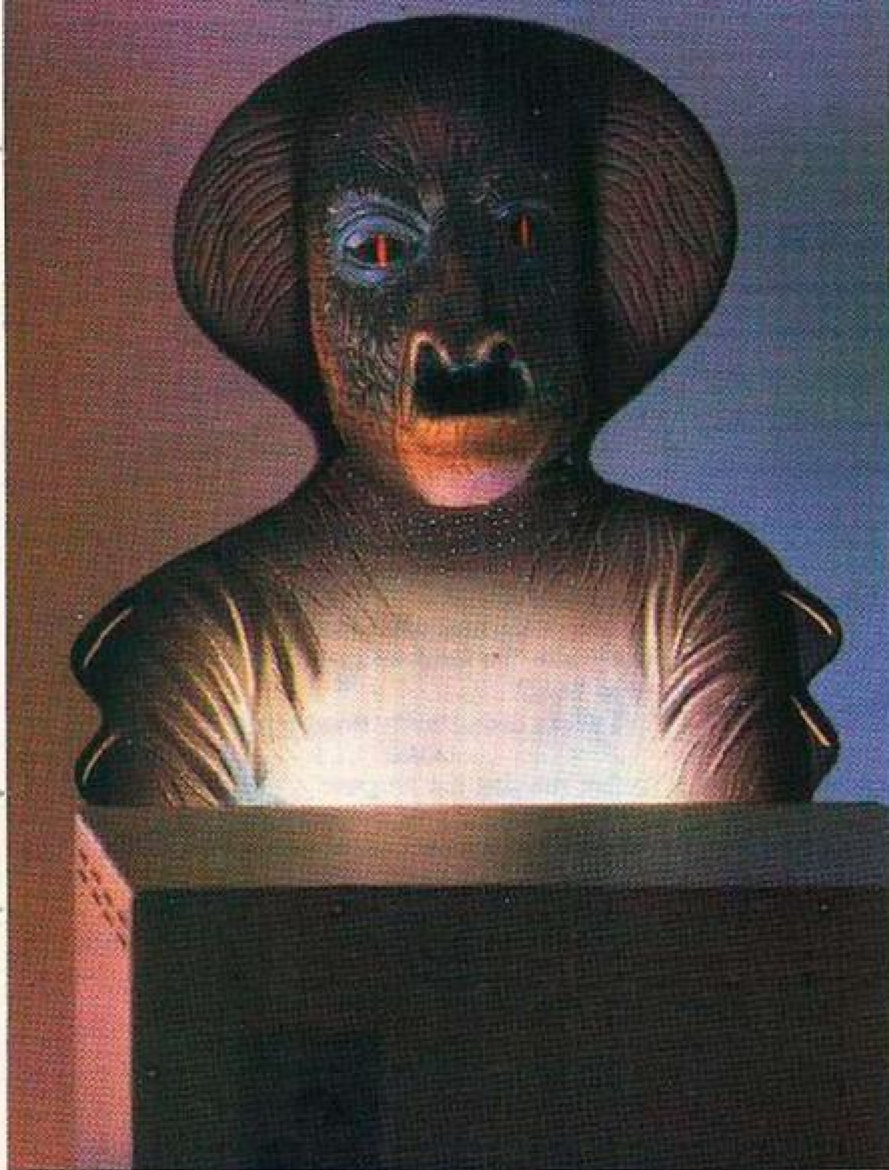
Only the fittest will survive.

As you establish yourself as a survivor, you will win the right to a higher rank.

In all, there are nine, from "Harmless" to "Elite." And your computer will continually tell you where you stand.

Trade with 2,000 planets in eight galaxies.

Besides survival, your success also depends on the rewards you reap from the cargo that you carry.



ce among the Elite?

That cargo can be anything from foodstuffs to contraband. If you decide to trade in contraband, the rewards will certainly be higher. But so will the risks you take.

To ply your trade, you can dock at any of 2,000 planets in eight galaxies.

However, before you dock, you must use your wits to assess the planet's political climate and the perils which may be waiting for you.

Also, in any of the eight galaxies, you may find yourself being asked to perform acts of considerable heroism and selfless courage.

Although these will bring you into danger, they can bring considerable rewards too.

We're waiting to recognize your skills.

Achieving higher status in Elite will tax your skills to the limit. Which is why you must download your game onto cassette or disc each time you take a break from play.

When you reach the rank of "Competent" or higher, you should send us the secret code number revealed to you by your computer.

We will send you in return a special document which certifies your achievement. And you stand to win a valuable prize.

Are you ready to accept the challenge?



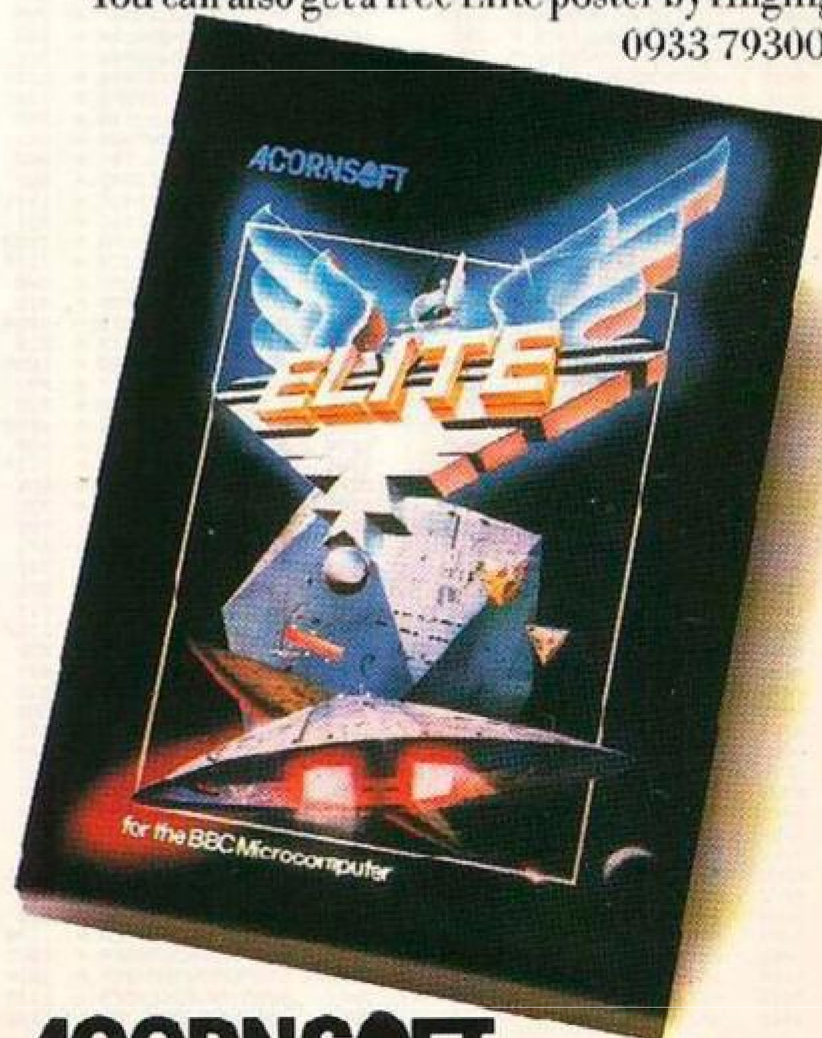
Elite is available on both disc and cassette for the BBC Micro and on cassette for the Acorn Electron.

With either, you will get "Elite: The Dark Wheel," a compelling novel which sets the whole mood of your adventure. You'll also get a flight training manual which will get you fit to roar into the unknown in your Cobra spacecraft.

Your Acornsoft dealer now has the entire package at £14.95 on cassette, or £17.65 on disc (for the BBC Micro) and £12.95 for the Electron. (For the address of your local stockist, call 01-200 0200.) Credit card holders can simply telephone 0933 79300 during office hours.

Alternatively, you can order by post from: Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL.

You can also get a free Elite poster by ringing 0933 79300.



ACORNSOFT

TRACK CHAS

Listing 1.

```
0 REM (C)COPYRIGHT BLADE SOFTWARE 1984
10 REM (C)COPYRIGHT A.MARDLIN 1983
20 POKE788,194
30 POKE37150,2
35 POKE36865,255:POKE36879,8
40 POKE648,16:POKE36869,192:POKE36866,22:POKE44,20:POKE256*20,0
50 REM*****************************************************************
*********
60 REM*****************************************************************
*********
70 REM*****************************************************************
*********
80 REM*****************************************************************
*********
90 REM*****************************************************************
*********
100 REM****************************************************************
*********
110 REM****************************************************************
*********
120 PRINT"[CLR]NEW"
130 PRINT"LOAD"
135 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT"RUN"
140 FORX=631TO640:POKEX,13:NEXT:POKE198,10:NEW
```

Listing 2.

```
20 DATA"    TRACK CHASE   "
30 DATA"    ___________   "
40 DATA"                  "
50 DATA"    HIGH  SCORE   "
55 DATA"                  "
60 DATA"      000000      "
80 DATA"                  "
90 DATA"                  "
100 DATA"    YOUR  SCORE  "
105 DATA"                 "
110 DATA"     000000      "
120 DATA"                 "
130 DATA"                 "
140 DATA"  PRESS ANY KEY  "
150 DATA152,1,160,255,32,186,255,169,,32,
189,255,162,255,160,255,32,213,255,76,9
3,27,,,,
155 PRINT"[CLR]"
160 FORX=0TO255:PRINT" ";:NEXT
165 FORX=1TO14:READY$:PRINTY$;:NEXT
168 PRINT"[HOME]";:FORX=0TO254:PRINT" ";:NEXT
170 FORX=0TO27:READY:POKE256+X,Y:NEXT
180 SYS256
```

Track Chase runs on the unexpanded Vic-20 with joystick but memory expansion will be needed to type it in.

First of all, type in listing 1 exactly as shown and save it on a blank cassette. Then type in listing 2 and save it on the same cassette. Now type in listing 3 and save it on another cassette.

Switch off your Vic-20 and plug in an 8K or 16K RAM cartridge.

Now type in:

POKE 641,0:POKE 642,33:POKE 648, 16 SYS 64824

Now load and run listing 3 and you will be presented with a menu:

1. Enter Code.
2. Check Code.
3. Save Code.

On pressing 1 you will be asked for a start address in decimal of the locations you wish to enter into. To finish and return to the menu, type "End".

To load code already saved type:

LOAD"",1,1

before running the program.

On pressing 2 you must also give the start address and this will allow you to view each location on a separate line.

Once you have finished keying in the code

Listing 4.

```
4602 : 202020202020A911 = 379
4610 : 810290A9C08D0550 = 988
4618 : A51E8D03A0A910ED = 813
4626 : 0090A9348D0190FD = 824
4634 : FF1C8DFC420060F8 = 1215
4642 : A900A1FE990010C9 = 942
4650 : 20F0D0A9824C3412 = 594
4658 : A900990094E6FBC0 = 1151
4666 : D0E8A01E5D0F9060 = 1035
4674 : 777F9DE98D1F5F76 = 1069
4682 : EFEF9D694F17488A = 1052
4690 : 489840A9008D1F91 = 732
4698 : A91F9148A97F8D22 = 692
4706 : 91A0209148A9FF8D = 1132
4714 : 2291E82980D00320 = 695
4722 : A0128AA2904D0003 = 708
4730 : 2020138A2908D003 = 481
4738 : 2068138A2910D003 = 551
4746 : 20E0128A2920D003 = 696
4754 : 20801369A968AA68 = 877
4762 : 60EAEAEAEAEA9A48 = 1476
4770 : AEFE1CE8BD0010C9 = 1094
4778 : 20D0C369AA60CA8E = 957
4786 : F81CC9A0D005A001 = 1014
4794 : 8CFD1C48ADFC1C9D = 1103
4802 : 0010E8688DFC1CA9 = 942
4810 : A09D0010A9059D00 = 664
4818 : 948EFE1C4CA01CEA = 1070
4826 : EAEAEAEAEAE48A48 = 1614
4834 : AEFE1CCA8D0010C9 = 1064
4842 : 20D0036EAA6E8E8E = 987
4850 : F31CC9AED003A001 = 1014
4858 : 8CFD1C4EADFC1C9D = 1103
4866 : 0010CA688DFC1CA9 = 912
4874 : A09D0010A9059D00 = 664
4882 : 948EFE1C4CA01CEA = 1070
4890 : EAEAEAEAEAE48A48 = 1614
4898 : ADFE1C18E910AA8D = 1087
4906 : 0010C92ED00368AA = 734
4914 : 68C9A8D005A001AC = 571
4922 : FD1C488A186911AA = 607
4930 : 8EFB1CADFC1C9D00 = 1031
4938 : 108A18E910AA688D = 642
4946 : FC1CA9A09D0010A9 = 551
4954 : 059D00948EFE1C4C = 810
4962 : A01C68AA60EAEA48 = 1002
4970 : ADFE1C186911AA8D = 560
4978 : 0010C920D0068A9A = 724
4986 : 68C9A8D005A0018C = 971
4994 : FD1C488A18E910AA = 934
5002 : 8EFB1CADFC1C9D00 = 1031
5010 : 108A186911AA688D = 715
5018 : FC1CA9A09D0010A9 = 951
5026 : 059D00948EFE1C4C = 810
5034 : F01C68AA60EAEA48 = 1002
5042 : [illegible] = 1145
5050 : C51340FB1CB00C68 = 1013
5058 : [illegible] = 1315
5066 : 0010C9A0D00C68AA = 962
5074 : [illegible] = 999
5082 : [illegible] = 877
5090 : 001068AA60DF0FAA = 799
5098 : F75B1F0F0FB34E8A = 820
5106 : 4B9848ADFA1CD00B = 966
5114 : FDF81CD04468AE68 = 1101
5122 : FA6060EEF61CA1F6 = 1301
5130 : 1CC930F01DC901D0 = 936
5138 : 0DA9D08D0C90A505 = 861
5146 : ED0E904CFA13C904 = 849
5154 : 10D0A9008D0C904C = 964
5162 : FA13ADF91CAEFA1C = 1171
5170 : 5D0010A9008DF61C = 757
5178 : EDF91C8DFA1C4CFA = 1163
5186 : 13EEF51CADF51CC9 = 1177
5194 : 30F01DC901D000A9 = 989
5202 : C08D0C90A9058D0E = 810
5210 : 504CFF13C904D09D = 1064
5218 : F9000D0C904CFF13 = 816
5226 : FDF71CAEF8:C9D00 = 1053
5234 : 10A9008DF51C8DF7 = 987
5242 : 1C8DF81C4CFF138D = 936
5250 : F71C8DF81C4CFF13 = 1042
5258 : 59DEAF2919216D62 = 792
5266 : 5E9B9A48ADFD1CD0 = 1137
5274 : E2606068203E13AE = 595
5282 : FE1CA005A9A00D0D = 930
5290 : 50A90F8D0E90A902 = 798
5298 : 5D0094202805A985 = 572
5306 : 5D0094202A:5A8DA = 742
5314 : ED203E15ADFE1C48 = 979
5322 : 106911C91130034C = 619
5330 : F1140DFE1C68AAA9 = 1127
5338 : 209D0010AEFE1CA9 = 930
5346 : A09D0010A9059D00 = 564
5354 : 942020134CC61468 = 539
5362 : A202BD0395290F0A = 366
5370 : 0A0A0AE3A02D0095 = 672
5378 : 290F85FD6085F38D = 945
5386 : 0B9CE0BD0095290F = 781
5394 : A020201500D0FA20 = 387
5402 : 3D15202915E00090 = 543
5410 : D1686842A018488A = 987
5418 : 409640A200A040CA = 384
5426 : D0F100D0FA60A060 = 1431
5434 : AA6660E3A9000D0D = 925
5442 : 900D0C980D08900D = 378
5450 : 0A9060EAEAEAEAEA = 1420
5458 : EAEAEAEAEAEAEAEA = 1872
5466 : EAEAEAEAEAEA400A = 1614
5474 : 489E48ADFE1C85FD = 1137
5482 : ADF41CC5FD304790 = 1286
5490 : 7DA6FCBD0010C9A0 = 1109
5498 : D005EAEA4C5917AE = 1042
5506 : F41CADF31C9D0010 = 889
5514 : ADF21C9D0094A6FC = 1156
5522 : 8EF41CBD00108DF3 = 1093
5530 : 1C8D00940DF21CA9 = 945
5538 : A09D0010A9009D00 = 659
5546 : 9468A868A96850EA = 1128
5554 : EAEAEAEAEAEAADF4 = 1821
5562 : 1C10E910AA20801C = 531
5570 : EA8D0010C920F005 = 917
5578 : 86FC4C7315AEF41C = 1044
5586 : CA8D0010C920D00A = 859
5594 : ADF41C106910AA4C = 835
5602 : FB:586FC4C7315EA = 1184
5610 : EAEAEFEAEAEAADF4 = 1821
5618 : 1C:85510AA20181C = 427
5626 : EAE8BD0010C920F0 = 1144
5634 : 0586FC4C7315AEF4 = 1021
5642 : 1CE8BD0010C920D0 = 905
5650 : 0AADF41C18E910AA = 899
5658 : 4CC31586FC4C7315 = 890
5666 : EAEAEFEAEAEAEAEA = 1872
5674 : EAEAEFEAEAEA4890 = 1620
5682 : 488A4EA2FF8D3094 = 1036
5690 : 290FC902D003900: = 631
5698 : 8CF11CCAD0EF58AA = 1332
5706 : 68A866EAEAEAADF: = 1492
5714 : 1CF006A9008DF11C = 853
5722 : 604C5E16EEFF1CAD = 982
5730 : FF1CC920D005A900 = 898
5738 : 8DE91C4C8E19EAEA = 1161
5746 : EAEAEAEAEAEA488A = 1614
5754 : 489848ADEF1C196D = 869
5762 : EE1C38EDED1CA8BD = 1183
5770 : 0010C920F050C9A0 = 930
5778 : D013ECFE1CD000A9 = 1130
5786 : 010DFD1C4CA7164C = 764
5794 : 6A17EAEAEAAEFCAF = 1389
5802 : EF1CADEC1C9D0010 = 877
5810 : ADEB1C9D0094A6FC = 1159
5818 : 8EEF1CBD00108DEC = 991
5826 : 1C3D0094ADEA1CA9 = 938
5834 : A09D0010F9042050 = 618
5842 : 1C68A868FA6060EA = 1008
5850 : EAEAEAEAEAEAADE3 = 1814
5858 : 1C1069EE1CC911D0 = 853
5866 : 30AEEF1CE8BD0010 = 926
5874 : C920F00DF9010DEE = 1035
5882 : 1CA9000DED1C4C73 = 824
5890 : 164EEF1CCA8D0010 = 870
5898 : C920F00DA9000DEE = 1034
5906 : 1C990:8DED1C4C70 = 885
5914 : 164DEF1C38E511A9 = 938
5922 : 8D3010C920F00DA9 = 860
5930 : 000DEE1CA9118DED = 971
5938 : 1C4C7316ADEF1C20 = 723
5946 : 301CAA3D0010C920 = 684
5954 : F0A7A9118DEE1CA9 = 1169
5962 : 008DED1C4C7D15EA = 963
5970 : EAEAEAEAEAEAECFE = 1894
5978 : 1CD0009A010CFD1C = 826
5986 : 4C81154CA315A920 = 695
5994 : 9D00104CE0165DF3 = 83[illegible]
6002 : 6DA5F89E959166A4 = 1241
6010 : E701DC9F50182050 = 835
6018 : 12ADDF1CF00AA9B0 = 1037
6026 : 8D0B9049058D8E90 = 769
6034 : A2008EDF1CACE61C = 985
6042 : CAD0FD380DFA8E08 = 1410
6050 : 90EAEAEAEAEAEAEA = 1782
6058 : EAEAEAEA20301620 = 1070
6066 : F013209514202018 = 55[illegible]
6074 : EAEAEAEAEAEACEDE = 1832
6082 : 1CD08B9ADE71C8DE = 1218
6090 : 1CADE81C4A0ACDE8 = 987
6098 : 1CF0032073162060 = 560
6106 : 15AD8D02C900D0F5 = 995
6114 : 4C80179DFF8F9D83 = 1118
6122 : CF78FA8A984DEC95 = 1330
6130 : 9BFE6D6524C97BBE = 1166
6138 : 8A901DBBC5A9A914 = 1053
6146 : 8DFE1CA9008DFD1C = 1014
6154 : ADFA1CADF91CADF9 = 1226
6162 : 1C6DF71C8DEE1CEF = 1085
6170 : EAEAA94080FC1C8D = 1263
6178 : EC1C8DE91CA9138D = 995
6186 : FB1CA9020DF21C8D = 1002
6194 : EB1C4EE41CA9010D = 908
6202 : F11C8DED1C8DE91C = 1077
6210 : ADFF1CC91FF020A9 = 1129
6218 : EA9DF41CA9E99DEF = 1429
6226 : 1CF9E0EAEAEAA240 = 1349
6234 : ADFF1CC910F002A2 = 1090
6242 : 7DEEF31C4C7D:0A9 = 932
6250 : E49DF41CA9E59DEF = 1419
6258 : 1CF9E6EAEAEAA940 = 1362
6266 : 8DF31CA9000DF61C = 996
6274 : 8DF51C200812A206 = 632
6282 : 206019A9A08D:410 = 691
6290 : A9058D14944C8317 = 713
6298 : EAEAEAEAEAEAA008 = 1572
6306 : A9008D0C908D0D98 = 764
6314 : 8DEA90A212A9A05D = 961
6322 : 00109DED1DA9069D = 759
6330 : 00949DED94CAD0ED = 1337
6338 : A2EEA9A09D00:09D = 1059
6346 : 1010A9069D00945D = 889
6354 : 10948F38E911AAE0 = 1032
6362 : EFD0E7ADB2181869 = 1132
6370 : 110DB2180DBA18AD = 884
6378 : 8D103EE9118DB518 = 857
6386 : 8DBD1EAEC718E88E = 1125
6394 : C7188ECF18AECA18 = 995
```

SE

Adrian Mardlin pits you and your Vic-20 against the aliens on the racetrack.



in listing 4, save it after listing 2 and then rewind and load using Shift and Run/Stop.

The object of Track Chase is to fill in the track green while avoiding the aliens which pursue you. Pressing fire will blast a temporary hole in the track.

Pressing Shift Lock will pause the game and if you press Shift at the same time as any other key while the title screen is being displayed the computer will be reset as if switched on and off.

If you are unable to key in Track Chase but would like a copy, then please send £2.50 to Track Chase Offer, 23 Fair Mile, Aylesbury, Buckinghamshire HP21 7JS.

Listing 3

```
1 REM HEXLOADER
5 L$="0123456789ABCDEF"
10 PRINT "J"
20 PRINT "1... ENTER":PRINT
30 PRINT "2... SAVE":PRINT
40 PRINT "3... CHECK":PRINT
50 INPUT "1 2 OR 3";F
60 IF F<1 OR F>3 THEN 50
70 ONFGOTO100,1000,800
100 REM ENTER CODE
110 INPUT "START, FINISH";S,F
120 FOR N=S TO F STEP 8
130 PRINT N;": ";
140 SUM=0
150 INPUT H$
155 IF H$="END" THEN STOP
160 FOR B=0 TO 7
170 C$=MID$(H$,1+2*B,2)
180 GOSUB 500
190 POKE (N+B),SS
200 SUM=SUM+SS
210 NEXT
220 INPUT " = ";T
230 IF SUM<>T THEN PRINT "ERROR IN LINE -
240 NEXT
250 GOTO 5
500 REM HEX TO DEC
510 B$=LEFT$(C$,1)
520 IF ASC(B$)>57THENB=ASC(B$)-55:GOTO540
530 SS=VAL(B$)
540 C=SS*16
550 B$=RIGHT$(C$,1)
560 IF ASC(B$)>57 THEN B=ASC(B$)-55:GOTO 580
570 B=VAL(B$)
580 SS=C+B:RETURN
600 REM
610 P1=INT(P/16):H$=MID$(L$,P1+1,1):
620 P2=P-P1*16:H$=H$+MID$(L$,P2+1,1):RETURN
630 RETURN
800 INPUT S,F
810 FOR N=S TO F STEP 8
820 PRINT N;": ";
830 SUM=0
840 FOR B=0 TO 7
850 P=PEEK(N+B):GOSUB 600
860 PRINT H$;
870 SUM=SUM+P
880 NEXT
890 PRINT" = ";SUM
900 GOTO 5
1000 REM SAVE CODE
1010 POKE780,1:POKE781,1:POKE782,255:SYS65466
1020 POKE780,0:SYS65469
1030 POKE780,0:POKE781,0:POKE782,32:POKE0,
     250:POKE1,17:SYS65496
1040 GOTO 5
```

```
6402 : CA9ECA18EED21898 = 1898     6850 : 10ADE71CC901F006 = 896      7298 : 00189D00199D001A = 389      7746 : 5D20205D205D2020 = 439
6410 : 0A0A186990A20F9E = 612      6858 : CEE71C4CD21A4EE6 = 1086     7306 : 9D001D9D001DCAD0 = 780      7754 : 202020202020205D = 317
6418 : 0E909D0B909848A2 = 840      6866 : 1CA2062D8F101869 = 721      7314 : DC4C22F15F8F8F8D = 1105     7762 : 205D20205D205D20 = 439
6426 : 40A00088D0FDCAD0 = 1231     6874 : E092AE1CFD0F44C = 1206      7322 : 85C40D0D1714A901 = 440      7770 : 7040404040405E20 = 574
6434 : FA60A088D085A900 = 1168     6882 : D01813030F120520 = 116      7330 : 80DF1C68AA6004A0 = 926      7778 : 5D205D20205D205D = 500
6442 : 9D0B909DC7108DCF = 1000     6890 : 1409011420140900 = 129      7338 : C08D0A9E20D01C8C = 687      7786 : 205D20202020205D = 378
6450 : 18A9108DCA188DD2 = 927      6898 : 0510120513050E14 = 102      7346 : 049020C01CCAD0F1 = 1057     7794 : 205D205D20205D20 = 439
6458 : 18A9008DB2198DB9 = 863      6906 : 2013030F120518FE = 562      7354 : 68AA602E26090830 = 807      7802 : 5D205D2020207040 = 490
6466 : 18A9ED8DD5198DBD = 1106     6914 : 9BADB5289F86D599 = 1384     7362 : F06072F873E6EAFC = 1545     7810 : 5B405B407D20205D = 592
6474 : 10A209DD07199D7A = 751      6922 : 9C40D00D150D0D01 = 634      7370 : 30145902BC14894F = 804      7818 : 205D205D2020205D = 439
6482 : 10A9069D7A94CAD0 = 1028     6930 : 4C941A22564136F8 = 743      7378 : 9F9E494B0E67468E = 794      7826 : 205D205D20202020 = 378
6490 : F2A2062080194C5D = 764      6938 : 6453B2C4F246ADE5 = 1271     7386 : 01A7090D02000030 = 195      7834 : 5D205D206D404040 = 551
6498 : 1BEAEAEAEAEA0701 = 1461     6946 : 1CD328F8ADE31C38 = 1008     7394 : 0000080040020001 = 75       7842 : 7D205D205D202020 = 471
6506 : 9D05A00F2605D2CF = 1845     6954 : C9010DE31CC999D0 = 1192     7402 : F102400100E9FE41 = 809      7850 : 205D205D20202020 = 378
6514 : 1C88EDEA1C186903 = 715      6962 : 1AADE41C38E9018D = 886      7410 : 024EEA0000C00030 = 300      7858 : 2020205D205D2020 = 378
6522 : C907901CC9148A43 = 811      6970 : E41CC999D00DF900 = 1080     7418 : 00134000141D2020 = 196      7866 : 20205D206D404040 = 490
6530 : A200A000CAD0FD89 = 1121     6978 : 8DE31C8DE41CF901 = 963      7426 : 2020202020202020 = 256      7874 : 404040407D205D20 = 538
6538 : D0FA60AA205019CA = 1140     6986 : 8DE31C2064000000 = 710      7434 : 2020202020202020 = 256      7882 : 2020205D20202020 = 317
6546 : D0EC608A48A900A8 = 1087     6994 : 0000000000000000 = 0        7442 : 704040406E202020 = 510      7890 : 202020202020205D = 317
6554 : 85FCA91085FD01FC = 1385     7002 : 000300200012F200 = 212      7450 : 2020704040406E20 = 510      7898 : 202020206D404040 = 429
6562 : 18690091FCA6FCE8 = 1304     7010 : 8DAF11DD5A11901F = 884      7458 : 205D2020205D2020 = 378      7906 : 4040404040404040 = 512
6570 : D002E6FD06FCE000 = 1303     7018 : 8D5A1118690185FD = 812      7466 : 2020205D2020205D = 378      7914 : 7D20202020202020 = 349
6578 : D0ECA6FDE011D0E6 = 1542     7026 : 8DAF11C5FD8005E8 = 1244     7474 : 20205D2020205D20 = 378      7922 : 2020202020202020 = 256
6586 : 68AA6000A200F8AD = 953      7034 : E005D0E4A2061DAE = 1197     7482 : 202020205D202020 = 317      7930 : 2020202020202020 = 256
6594 : E41C1869028DE41C = 764      7042 : 119D5911CAD0F7A2 = 1099     7490 : 5D20205D2020205D = 439      7938 : 2020202020202020 = 256
6602 : ADE01C186DE31C00 = 621      7050 : 00EAEAEAAA21EE00F = 1057    7498 : 20202020205D2020 = 317      7946 : 2020202020202020 = 256
6610 : 8DE01CADE11C28EA = 1093     7058 : 908D00119D00108D = 712      7506 : 205D20206D404040 = 490      7954 : 70404040406E2020 = 542
6618 : 6DE41C098DE11CAD = 940      7066 : 00959D0094CAD0F1 = 1105     7514 : 5B40404040405B40 = 566      7962 : 2070404040406E20 = 542
6626 : E21C2869008DE21C = 754      7074 : 8E1F91AD1F912920 = 740      7522 : 40407D2020202020 = 413      7970 : 205D202020205D20 = 378
6634 : D0A2008EE51CA96E = 1656     7082 : F005A5C5C940F0F0 = 1353     7530 : 205D20202020205D = 378      7978 : 20205D202020205D = 378
6642 : 8D0F90A9209D0010 = 674      7090 : A91D20601CA9108D = 680      7538 : 2020202020202020 = 256      7986 : 20205D202020205D = 378
6650 : CAD0FAA20FBDE31A = 1279     7098 : E41CA9408DE61CA9 = 1057     7546 : 20205D2020202020 = 317      7994 : 2020205D20202020 = 317
6658 : 9D3310A9019D3394 = 758      7106 : 028DE71C8DE91C8E = 946      7554 : 5D20202020202020 = 317      8002 : 5D20205D20202020 = 378
6666 : CAD0F2A20DBDF21A = 1284     7114 : E91C8EE51C8EE31C = 1056     7562 : 2020205D20202020 = 317      8010 : 5D2020205D202020 = 378
6674 : 9D7A10A9019D9A94 = 956      7122 : 8EE21C8EE11C8EE0 = 1157     7570 : 205D202020202020 = 317      8018 : 205D20205D202020 = 378
6682 : CAD0F2ADE41C4A4A = 1229     7130 : 1CA206A9D09DFE11 = 889      7578 : 7040404058404040 = 587      8026 : 205D2020205D2020 = 378
6690 : 4A4A1869308D5B10 = 573      7138 : CAD0FAEAEAEAEAEA = 1830     7586 : 40405B4040406E20 = 553      8034 : 20205D20205D2020 = 378
6698 : ADE41C290F186930 = 662      7146 : EAEAEA4C0018E470 = 1142     7594 : 205D2020205D2020 = 378      8042 : 20205D2020205D20 = 378
6706 : 8D5C10ADE31C4A4A = 825      7154 : 87FADF36F4BBF996 = 1668     7602 : 2020205D2020205D = 378      8050 : 2020205D20206D40 = 426
6714 : 4A4A1869308D5D10 = 575      7162 : 8244D618BEE9E4FD = 1393     7610 : 20205D2020205D20 = 378      8058 : 4040405B4040405B = 566
6722 : ADE31C290F186930 = 661      7170 : B008A5FD86F830E5 = 1275     7618 : 202020205D202020 = 317      8066 : 404040407D202020 = 477
6730 : 8D5E10A9018D5B94 = 901      7178 : FBC90A300160B868 = 943      7626 : 5D20205D2020205D = 439      8074 : 202020205D202020 = 317
6738 : 8D5C948D5D948D5E = 958      7186 : 4CCF15EAEAEAE4FD = 1487     7634 : 20202020205D2020 = 317      8082 : 5D20202020202020 = 317
6746 : 94A203A000BDDF1C = 913      7194 : 900738E5FDC90A80 = 1076     7642 : 205D20206D404040 = 490      8090 : 20202020205D2020 = 317
6754 : 4A4A4A4A18693099 = 626      7202 : 016068694C081680 = 539      7650 : 7D20202020206D40 = 458      8098 : 205D202020202020 = 317
6762 : C010A90199C094C8 = 1071     7210 : 13D4BA05D03048CE = 970      7658 : 40407D2020202020 = 413      8106 : 2020202020205D20 = 317
6770 : BDDF1C290F186930 = 673      7218 : EA1CADEA1C4AEA85 = 914      7666 : 2020202020202020 = 256      8114 : 20205D2020202020 = 317
6778 : 99C010A90199C094 = 1024     7226 : FDADEA1CC5FDF005 = 1393     7674 : 2020202020202020 = 256      8122 : 202020202020205D = 317
6786 : C8CAD0D99EE31CA9 = 1393     7234 : 6813691160A6A8A8 = 658      7682 : 2020202020202020 = 256      8130 : 2020205D20202020 = 317
6794 : 108DE41CA8BD0094 = 918      7242 : 68A868A46F605D00 = 903      7690 : 2020202020202020 = 256      8138 : 2020202020202020 = 256
6802 : 290FC901D078A907 = 762      7250 : 94A2FE8EEA1C60C9 = 1265     7698 : 7040404040404040 = 560      8146 : 5D2020205D202020 = 378
6810 : 9D0094CAD0EF2020 = 1026     7258 : 0B1A0D010181EDFF = 577      7706 : 4040404040406E20 = 526      8154 : 2020202020202020 = 256
6818 : 1520281520281520 = 239      7266 : 1CA0BDA2D0A1A4A8 = 753      7714 : 205D202020202020 = 317      8162 : 206D4040407D2020 = 522
6826 : 281588D0E0A1E91C = 1663     7274 : 68A90042009DE012 = 610      7722 : 202020202020205D = 317      8170 : 2020202020202020 = 256
6834 : D01FA91D8DFF1CEE = 1099     7282 : 9D00139D00149D00 = 510      7730 : 20205D2070404040 = 493      8178 : 2020202020202020 = 256
6842 : E81CADE81C2901D0 = 943      7290 : 159D00169D00179D = 537      7738 : 4040404040406E20 = 526      8186 : 2020202020204C80 = 396
```

To load first type in the Basic loader in listing 1 and save it to tape. Run this and the program asks for the start and end addresses. These are:

Listing 2 — &H28C0 — &H29A3
Listing 3 — &H29EF — &H2A15
Listing 4 — &H2A3F — &H2A7E
Listing 5 — &H2B26 — &H3C8B

Listings 2, 3 and 4 are data for graphics and variables. Listing 5 is the game. Type in the listings in order and save each one to tape using CSaveM. Note you must press enter after typing each pair of numbers. When you have them all on tape, switch off and on CLoadM each part of the game in order, then save the whole game on a separate tape using—

CSAVEM"TANK" &H2800 &H3C8B
&H2B26

To load it in, use CLoadM; to run it type Exec. To play the game use these keys:

Move tank up — Up arrow
Move tank down — Q key
Fire — Clear key
Hyperspace — Enter key

You start on a range you have a set of boxes on the left hand side of the screen, with a gap moving down. You have to shoot through the gap into the box. When you hit a box it will fill, but be careful because if you miss your shot bounces back and if it hits you, you loose a life. But it's not that easy because about every 40 seconds a bomb drops on you and the only way to avoid this is to hyperspace.

When all the boxes are full you move on to the next screen. Here there is no bomb and you can't hyperspace. You have eight aliens to shoot at but only one is in range at any one

Listing 1.

```
10 REM HEXLOADER - ENTER THE
20 REM STRING OF HEX DIGITS FIRST
30 REM AND THEN THE CHECKSUM
40 PRINT "ENTER START ADDRESS ";:INPUT START
50 PRINT "ENTER FINISH ADDRESS";:INPUT FINISH
60 FOR N = START TO FINISH STEP 8
65 PRINT N;": ";
70 TT=0:INPUT A$:Z=0
80 FOR G=1 TO LEN(A$) STEP 2
90 P=VAL ("&H"+MID$(A$,G,2))
100 TT=TT+P:POKE (N+Z),P
110 Z=Z+1:NEXT
120 PRINT " = ";
130 INPUT T$
150 IF VAL(T$)<>TT THEN PRINT "ERROR - ENTER LINE AGAI
N":GOTO 70
160 NEXT
```



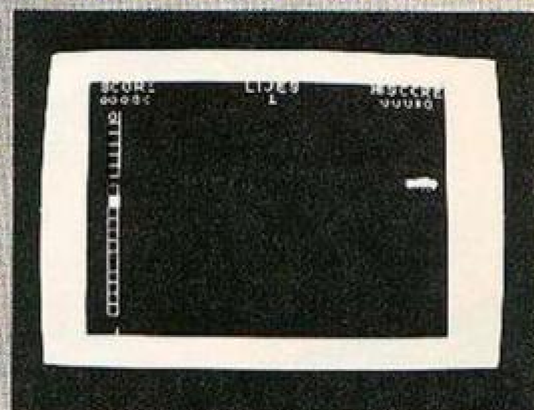
time. These fire at you as they move up and down the screen.

When these have been destroyed you get eight more different ones. There are three types of alien. Once you have cleared three screens everything speeds up.

If you can't face typing in the program I will gladly send you the game on tape. Just send a PO for £3.50 to: 113 Tairfelin Windmill, Bridgend, South Wales.

DRAGON TANKS

After a hard day on the range try a machine-code flip into hyperspace to meet a few aliens. Rick Ludkiewicz plays General Patton.



Listing 2.

```
10240 : 00C1FF00013F7FFF = 702
10248 : 7A3006013FFFFFFF = 1005
10256 : FFFFFFEB4066C0E0 = 1582
10264 : FEFEF0FFFFFFAE06 = 1693
10272 : 64FFB0B0B0B0B080 = 1123
10280 : B0FFB0B0B0B0B080 = 1151
10288 : B0FFB0B0B0B0B080 = 1151
10296 : B0FFB0B0B0B0B080 = 1151
10304 : B0FFB0B0B0B0B080 = 1151
10312 : B0FFB0B0B0B0B080 = 1151
10320 : B0FFB0B0B0B0B080 = 1151
10328 : B0FFB0B0B0B0B080 = 1151
10336 : B0FFB0B0B0B0B080 = 1151
10344 : B0FFB0B0B0B0B080 = 1151
10352 : B0FFB0B0B0B0B080 = 1151
10360 : B0FFB0B0B0B0B080 = 1151
10368 : B0FFB0B0B0B0B080 = 1151
10376 : B0FFB0B0B0B0B080 = 1151
10384 : B0FFB0B0B0B0B080 = 1151
10392 : B0FFB0B0B0B0B080 = 1151
10400 : B0FFB0B0B0B0B080 = 1151
10408 : B0FFB0B0B0B0B080 = 1151
10416 : B0FFB0B0B0B0B080 = 1151
10424 : B0FF4242667E7E7E = 995
10432 : 7E7E3C18180C0C1E = 414
10440 : 0FE0241212110800 = 240
10448 : 4220211088003020 = 363
10456 : 21110F0000202111F = 173
10464 : 0B00422021120800 = 165
10472 : 241212110B001B0C = 133
10480 : 0C10BFB0404411F0 = 688
10488 : 6040441100904044 = 521
10496 : 11010E404411E0C0 = 591
10504 : 4044110030404221 = 360
10512 : 010B4C414100907C = 471
10520 : 40B1FC6044419OC0 = 982
10528 : C1E0FE4442412121 = 930
10536 : 10B0444422021108 = 341
10544 : B07C4302021110F0 = 596
10552 : 4440C20211E08044 = 765
10560 : 4422021120B04442 = 415
10568 : 41212110B04441B0 = 536
10576 : C0C10EFB102B4444 = 833
10584 : 44442E1010305010 = 352
10592 : 10101C7C102B4408 = 304
10600 : 10204C7C7C040B10 = 388
10608 : 0844281040404048 = 396
10616 : 487C0B0B7C404038 = 520
10624 : 0844281004081030 = 204
10632 : 4844281070C04C810 = 348
10640 : 1020404030444443E = 424
10648 : 2844443B3C44443C = 488
10656 : 0404040400 = 16
```

Listing 3.

```
10735 : 1818FFFF18181818 = 554
10743 : 187EFF10386CC76C = 892
10751 : 3810925438FE3854 = 752
10759 : 92C62954DE5429C6 = 1014
10767 : C0603B1F3B600000 = 719
```

Listing 4.

```
10815 : 082A160000000000 = 72
10823 : 000000594F55528F = 479
10831 : 3F53434F52458F8F = 809
10839 : 3F8F8F48496D5343 = 833
10847 : 4F52458F8F8F8F8F = 945
10855 : 3F8F8F414E4F5448 = 807
10863 : 45528F8F474F8F8F = 873
10871 : 3F8F8F69595C4E69 = 897
```

Listing 5.

```
11046 : 3605B7298386C0B7 = 859
11054 : 29BA108E0514108F = 617
11062 : 29C58E00008F29A4 = 776
11070 : C60110BE29ABE600 = 703
11078 : A7A05A26FB86F5B7 = 1263
11086 : FFC5B7FFC5B7FFC7 = 1722
11094 : 3A03B7FF228EC60C = 766
11102 : 3600108E1800F7B0 = 611
11110 : 313F108C00026F6 = 552
11118 : 8629BA8100102E09 = 609
11126 : 10108E03E810BF29 = 657
11134 : 0BC600F729DD108E = 1084
11142 : 0601BE28C4C6C886 = 725
11150 : 06B729B2A680F7A0 = 1029
11158 : B629B24AB729B226 = 915
11166 : F331A81A5A26EB10 = 862
11174 : 8E060E8E28F4C60E = 794
11182 : 3605B729B2A680A7 = 1002
11190 : A0B629B24AB729B2 = 1037
11198 : 26F331A81B5A26EE = 885
11206 : 108E0619BE291CC6 = 598
11214 : 08B607B729B2A680 = 845
11222 : A7A0B629B24AB729 = 1026
11230 : B226F331A81B5A26 = 829
11238 : E8108E0902EE2821 = 616
11246 : C699A6B0A7A431A8 = 1193
11254 : 205A26F6108E1B1C = 619
11262 : 8E2B00C608A680A7 = 852
11270 : A431A8205A26F610 = 803
11278 : 8E1B1DC608A680A7 = 868
11286 : A431A8205A26F610 = 803
11294 : 8E1B1EC608A680A7 = 869
11302 : A431A8205A26F610 = 803
11310 : BE0761B629A88D54 = 862
11318 : 108F0762B629A98D = 796
11326 : 48108E0763E629AA = 732
11334 : 8042108E0764B629 = 695
11342 : A88D39108E0765B6 = 817
11350 : 29AC8D30108E077A = 639
11358 : B629AD8D27108E07 = 741
11366 : 73B629AE8D1E108E = 849
11374 : 077CB629AFED1510 = 707
11382 : 8E077DB629E08D0C = 826
11390 : 108E077EB629B18D = 832
11398 : 031600D3B1C0272F = 451
11406 : B1012738B1C22747 = 459
11414 : B1032753B1C4275F = 521
11422 : B1052768B1C61027 = 470
11430 : 00758107102700 7F = 435
11438 : 8108102700E98109 = 457
11446 : 1027009316C0AC8E = 526
11454 : 2954C608A6E0A7A4 = 956
11462 : 31A8205A26F6398E = 822
11470 : 295CC608A6E0A7A4 = 954
11478 : 31A8205A26F6398E = 822
11486 : 2964C608A6E0A7A4 = 972
11494 : 31A8205A26F6398E = 822
11502 : 296CC608A6E0A7A4 = 990
11510 : 31A8205A26F6398E = 822
11518 : 2974C608A6E0A7A4 = 988
11526 : 31A8205A26F6398E = 822
11534 : 297CC608A6E0A7A4 = 996
11542 : 31A8205A26F6398E = 822
11550 : 2984C608A6E0A7A4 = 1004
11558 : 31A8205A26F6398E = 822
11566 : 298CC608A6E0A7A4 = 1012
11574 : 31A8205A26F6398E = 822
11582 : 2994C608A6E0A7A4 = 1020
11590 : 31A8205A26F6398E = 822
11598 : 299CC608A680A7A4 = 1028
11606 : 31A8205A26F6398E = 862
11614 : 29B3108E0750BD2C = 698
11622 : 8A8E0903B680C6A7 = 919
11630 : A7843088205A26F8 = 891
11638 : 108E0902B629BA17 = 601
11646 : FF0A8E1B1C108E28 = 660
11654 : 0BC617F729BFC618 = 933
11662 : F729C88600B729C7 = 1048
11670 : B729E3C601F729E3 = 1167
11678 : F729C0175262810C = 824
11686 : 1027012D810D1027 = 298
11694 : 03977E307A17008C = 693
11702 : 170100B60155B10F = 644
11710 : 2709B60153B1EF27 = 721
11718 : 6720BEC602F729B9 = 958
11726 : 3089014086 00A784 = 603
11734 : C60B30BBE0A6A2A7 = 1112
11742 : B45A26F630890161 = 789
11750 : B600A784C60B31A8 = 859
11758 : 1630BBE0A6A2A784 = 1057
11766 : 5A26F63089016186 = 751
11774 : 00A784C60B31A816 = 747
11782 : 30BBE0A6A2A7845A = 1125
11790 : 26F63135301EBC08 = 612
11798 : BC2F15F629B95AF7 = 1065
11806 : 29B926ACF629C0C1 = 1108
11814 : 00102700B616FF59 = 603
11822 : C602F729B9B600A7 = 974
11830 : 84C6083135308820 = 659
11838 : A6A0A7845A26F630 = 1047
11846 : A9FFA1BA00A7A4CA = 1183
11854 : 0B308820A6A0A784 = 852
11862 : 5A26F63089FEA186 = 1108
11870 : 00A784C60B308820 = 724
11878 : A6A0A7845A26F631 = 1048
11886 : A8EA3089FEBE8C1C = 1199
11894 : BC102CFF4EF629B9 = 1053
11902 : 5AF729B9C10026AD = 967
11910 : F629C0C100102700 = 727
11918 : 5216FEF59F29B78E = 1208
11926 : 29B4F629368680A7 = 1119
11934 : 84308B203F29B430 = 808
11942 : B90100B600A7845A = 661
11950 : F729B6C1002715BE = 913
```

(continued on page 107)

(continued from page 105)

```
11958 : 29B7393420:0BF29 = 612
11966 : C5313F10BC000C26 = 503
11974 : F335203980E0903BF = 735
11982 : 29B4C699F729B620 = 1074
11990 : DEC600F729C0F729 = 1188
11998 : E3BD30F629C0C101 = 1389
12006 : 1027FE9D7E2F2B8D = 825
12014 : A37E307ABDC51751 = 901
12022 : 0FA10D1C27024A06 = 470
12030 : 01558IDF1027FEC3 = 942
12038 : B60153B1EF1027FF = 944
12046 : 1F20C0BF29B810BF = 897
12054 : 29DD30883FBF29C1 = 902
12062 : B6FFA7B417050EBE = 920
12070 : 29BB10BE29B0398F = 912
12078 : 29BB10BF29BDBE29 = 896
12086 : C1F629BF8629C781 = 1222
12094 : 00263EB600BBE29C1 = 666
12102 : 313467A4693F4A26 = 730
12110 : F9301FBF29C1301F = 837
12118 : A684B10026185AF7 = 831
12126 : 29BFC10010270280 = 623
12134 : BE29BB10BE29BDF6 = 1130
12142 : 29E5C10010270210 = 540
12150 : 16FF7417C442BE29 = 717
12158 : C1F629CBB600B727 = 1049
12166 : CC8601B729C7BE29 = 993
12174 : C13002A6A91002A = 708
12182 : 49BE29C131B466A4 = 944
12190 : 6621B629C24A8729 = 860
12198 : CCE10026F13001BF = 852
12206 : 29C15AF729CDC100 = 1008
12214 : 2713BE29B310BE29 = 723
12222 : BDF629E5C1001026 = 952
12230 : 01CB16FF228600B7 = 832
12238 : 29C7A734301FA784 = 917
12246 : BE29BB10BE29BD16 = 876
12254 : FDA7BE29C1B600A7 = 1145
12262 : 84301FA784B629B3 = 912
12270 : 4AB729B3C60BEE29 = 917
12278 : BBB600A7B430E820 = 936
12286 : 5A26FB30B9FEA1C6 = 1171
12294 : 0BA7B430BB205A26 = 654
12302 : FB30B9FEA1C60BA7 = 1224
12310 : 8430BB205A26FBC6 = 922
12318 : 0BBE29EB30011 0BE = 636
12326 : 29EFA600A7B430BB = 1008
12334 : 205A26F6B629B301 = 937
12342 : C0270617030016FB = 552
12350 : 0CC60BF72A3F7E3B = 755
12358 : C212121212121212 = 320
12366 : 1212121212121212 = 144
12374 : 1212121212121212 = 144
12382 : 1212121212121212 = 144
12390 : 1212121212121212 = 144
12398 : 1212121212121212 = 144
12406 : 12121212BF29BB10 = 507
12414 : BF29BDF629BDC100 = 1122
12422 : 262D.0BE29EB313F = 659
12430 : 10BF29DB10EC0000 = 623
12438 : 2656C601F729DDBE = 1022
12446 : 29DEBF29E110BE28 = 918
12454 : BAC60AA6A0A7B430 = 1067
12462 : BB205A26F6C604F7 = 991
12470 : 29E0EE29E1B600A7 = 1022
12478 : 8430BB20AF29E1C6 = 1003
12486 : 0A10BE2BBAA6A0A7 = 887
12494 : 8430BB205A26F630 = 770
12502 : BB20A6B431002 64A = 707
12510 : 8C1C902C27F629E0 = 919
12518 : 5AF729E0C10026CA = 1035
12526 : BE29B310BE29BDF6 = 1100
12534 : 29E5C10210270094 = 660
12542 : F629E3C1001027FD = 1015
12550 : EB16FCA9BE29E1C6 = 1332
12558 : 0A8600A7843C0B20 = 657
12566 : 5A26FBC600F729DD = 1037
12574 : 10BE03EB10BF29DB = 860
12582 : 20C6BE29E1C60AB6 = 1028
12590 : 00A7B430EB205A26 = 643
12598 : FBC600F729DD10BE = 1113
12606 : 03EB1CBF29DB16FE = 978
12614 : 99BF29DB10BF29D3 = 1009
12622 : BE29C1B600A73430 = 905
12630 : 1FA7B4BE29BBC602 = 948
12638 : F729E5C60BB600A7 = 1027
12646 : 8430BB205A26F830 = 772
12654 : B9FEA1C603A78430 = 1108
12662 : BB205A26F830B9FE = 983
12670 : A1C60BA784308B20 = 885
12678 : 5A26FBDE29BB17FD = 1070
12686 : 037E307A1217FD22 = 628
12694 : 10BE29E63:3F10BF = 796
12702 : 29E6108C00002702 = 468
12710 : 20E4108E003210BF = 575
12718 : 29E6BE29BB10BE28 = 887
12726 : 00C60BA6ACA7B430 = 882
12734 : BB205A26F6BE29BB = 960
12742 : 3001C6CBA6A0A7B4 = 883
12750 : 308E205A26FAB E29 = 821
12758 : BB3C02C60BA6A0A7 = 939
12766 : 8430BB205A26F6BE = 912
12774 : 29BB31ABEAC600F7 = 1124
12782 : 29F516FB94301FA6 = 936
12790 : 8481B01326FD7C30 = 868
12798 : 02B600A7B4301E30 = 561
12806 : BBE0968481FF26F7 = 1327
12814 : BF293310BF29D317 = 927
12822 : 01CDBE29D3:0BE29 = 895
12830 : D5C60B86FFA78430 = 1155
12838 : BB205A26FB10BE29 = 791
12846 : A4312A10BF29A4F6 = 849
12854 : 29AB4CB1092E10E7 = 671
12862 : 29AB108E0764B629 = 700
12870 : AB17FA40160CAB66 = 835
12878 : 00B729AB108E0764 = 660
12886 : B629AB17FA2EB629 = 936
12894 : AA4CB1092E10B729 = 670
12902 : AA:08E0763B629AA = 827
12910 : 17FA151A00B4B602 = 506
12918 : B729AF108E0763B6 = 840
12926 : 29AA17FA07B629A9 = 883
12934 : 4CB1092E10B729A9 = 669
12942 : 10EE0762D629A917 = 678
12950 : F9F21600500600B7 = 923
12958 : 29A9108E0762B629 = 696
12966 : A917F9E0B629AB4C = 1132
12974 : 01092E0B10BE0761 = 459
12982 : B629AB17F9CE1600 = 891
12990 : 39B600B729AB108E = 741
12998 : 0761B629AB17F9BC = 955
13006 : B729A9:08E0762B6 = 838
13014 : 29A917F9AFB729AA = 1051
13022 : 108E0763B629AA17 = 680
13030 : F9A2B729AB108E07 = 971
13038 : 64B629AB17F995B7 = 1098
13046 : 29ABBE0902C699A6 = 382
13054 : 848180102700923 0 = 638
13062 : BB205A26F710BE29 = 785
13070 : A431A900CB10BF29 = 830
13078 : A4B629AA4C4CB109 = 847
13086 : 2E0CB729AA108E07 = 617
13094 : 6317F960207 5B10A = 733
13102 : 271BB601B729AA10 = 611
13110 : EE076317F94EB629 = 821
13118 : A94CB1092E278762 = 701
13126 : 17F94120568600B7 = 772
13134 : 29AA108E076317F9 = 747
13142 : 33B629A94CB1092E = 703
13150 : 0CB729A9108E0762 = 668
13158 : 17F92120368600B7 = 708
13166 : 29AB108E076117F9 = 743
13174 : 13B729A9108E0762 = 675
13182 : 17F909B729AA108E = 853
13190 : 0763:7F8FFE729AB = 1027
13198 : 108E076417F8F520 = 813
13206 : 0ABE29BE10BE29BD = 864
13214 : 16F9E6B629BA4C57 = 1169
13222 : 29BABE0BA0060010 = 687
13230 : BE1560A7B0313F10 = 682
13238 : 8C00C026F61500C9 = 647
13246 : B634F7FF1D8635B7 = 1023
13254 : FF1F863FB7FF238E = 1098
13262 : 0010B6B03D004F8D = 647
13270 : 05301F26F539C660 = 718
13278 : A7FF205A26FA3786 = 1039
13286 : 34B7FF1D8635B7FF = 1144
13294 : 1F863FB7FF238EC0 = 843
13302 : 10368D8D004F8DC5 = 652
13310 : 301F26F539C630E7 = 848
13318 : FF205A26FA390634 = 908
13326 : B7FF1D8635B7FF1F = 1123
13334 : B63FB7FF238E0099 = 965
13342 : B6YYBD084F8E0530 = 707
13350 : 1F26F539C699B7FF = 1150
13358 : 205A26FA3934368E = 715
13366 : 0001108E00013001 = 209
13374 : B609B7FF207F0112 = 759
13382 : 7F0113B6FF238A08 = 765
13390 : B7FF23D6FF0134F7 = 1290
13398 : B7FF01B6FF0334F7 = 1250
13406 : B7FF0373FF203410 = 911
13414 : 301F26FC351010BC = 642
13422 : 01122DEF0C007026 = 593
13430 : C535362910 0C0514 = 544
13438 : 10BF2935C608F72A = 940
13446 : 3FBE2A16BF2A40B6 = 700
13454 : 30B72A42B629BAB1 = 829
13462 : 312707810227491 6 = 312
13470 : 00BB108E2A1610BF = 568
13478 : 2A278E09E2AF44C6 = 995
13486 : 08F72A26AE9F2A27 = 749
13494 : 108E27FAL607A6A0 = 780
13502 : A7B430BB2C5A26F6 = 389
13510 : F62A265AF72A26C1 = 936
13518 : 00260316009C3089 = 404
13526 : 014010EE2A273122 = 435
13534 : AFA410EF2A2723CC = 863
13542 : 108E2A1610BF2A27 = 510
13550 : EE09E2AFA43A00F7 = 1169
13558 : 2A26AE9F2A27108E = 652
13566 : 2A08C607A6A0A7B4 = 880
13574 : 30BB205A26F6F62A = 878
13582 : 265AF72A26C10026 = 686
13590 : 02205730B9014010 = 307
13598 : BE2A273122AFA410 = 709
13606 : BF2A2720CD:0BE2A = 709
13614 : 16108F2A278EU9E2 = 607
13622 : AFA4C608F72A26AE = 1046
13630 : 9F2A27108E2A0FC6 = 653
13638 : 07A6A0A7B4308E20 = 848
13646 : 5A26F6F62A265AF7 = 1037
13654 : 2A26C10026022012 = 363
13662 : 30B9014C10BE2A27 = 537
13670 : 3122AFA410BF2A27 = 710
13678 : 20CD108E1D1CBE28 = 632
13686 : 00C6CBA6B0A7A431 = 883
13694 : AE205A26F6108E1B = 759
13702 : 1CC6CBA6A0A7A431 = 913
13710 : AB205A26F610BE1B = 759
13718 : 1EC60BA6B0A7A431 = 913
13726 : AB205A26F6BE09E4 = 953
13734 : BF2A29108E09E2C6 = 865
13742 : 07A6A4A7B431A320 = 885
13750 : 30BE205A26F38E09 = 738
13758 : E2108E2A2BC607A6 = 840
13766 : E4A7A030BB205A26 = 803
13774 : F6BE09E2C607B600 = 962
13782 : A7B430BB205A26FB = 891
13790 : BE1B1C108E2B0BC6 = 604
13798 : BFF729B6C600F72A = 1100
13806 : 32C615F72A73C633 = 858
13814 : F72A398600B72A45 = 774
13822 : C516F729BFB600B7 = 1016
13830 : 29C7B729E5C601F7 = 1139
13838 : 29E3F729C01745F0 = 1384
13846 : 810C.02701C71700 = 419
13854 : FAF62A45C1011027 = 856
13862 : 059A1700B9B60155 = 667
13870 : 8:DF2705B60153B1 = 795
13878 : EF27672 0C3C602F7 = 1055
13886 : 29B9308901408630 = 6:0
13894 : A704C60B30BBE046 = 1082
13902 : A2A7845A26F53089 = 1020
13910 : 01618600A7B4C60B = 740
13918 : 31A816308BE0A6A2 = 975
13926 : A7845A26F6308901 = 859
13934 : 618600A734C60B31 = 768
13942 : A81630BB20A6A2A7 = 1093
13950 : 845A25F63135301E = 886
13958 : 8C08BC2F15F629B9 = 876
13966 : 5AF729B926ACF629 = 1060
13974 : C0C1001027015016 = 543
13982 : FF5EC602F729A9F6 = 1156
13990 : 0037B4C60B313530 = 653
13998 : BB20A6A0A7B45A26 = 921
14006 : F6308 9FEA1B600A7 = 1147
14014 : A4F60B308B20A6A0 = 883
14022 : A7845A26F63089FE = 1112
14030 : A1B600A7E4C60B33 = 851
14038 : BB20A6A0A7845A25 = 921
14046 : F631AEEA3089FEBE = 1326
14054 : 0C1CBC102CFF4EF6 = 995
14062 : 29B95AF729B9C100 = 982
14070 : 26FDF629C0C10010 = 899
14078 : 27C0EC16FEFA10BF = 1008
14086 : 2A4710BE29C5313F = 669
14094 : 108C003025FB10BE = 648
14102 : 2A47398F29BB:0BF = 796
14110 : 29B0BE2A2917039E = 687
14118 : B629B38100102704 = 590
14126 : 8DB62A45B1011027 = 619
14134 : 040AB62A42B10016 = 577
14142 : 26F341F62A32C10C = 887
14150 : 2637C6078600A784 = 731
14158 : 30BB20BF2A29108E = 648
14166 : 2A20A6A0A7843088 = 874
14174 : 205A26F6F629B65A = 965
14182 : F729B6C100270 0BE = 900
14190 : 29BB10BE29BD39C6 = 919
14198 : 01F72A32C60FF727 = 769
14206 : B6DE2A2917033FB6 = 726
14214 : 29B3B1C01027042E = 454
14222 : B62A45B101102704 = 482
14230 : 2BB62A42B1001026 = 516
14238 : FCE2B600308900E0 = 1021
14246 : F78430BBE0108E2A = 907
14254 : 32C607A6A2A78430 = 930
14262 : BBE05A25F63F2A29 = 1006
14270 : F629B65AF729B6C1 = 1222
14278 : 002700BE29BB10BE = 671
14286 : 29BD39C6BFF729B6 = 1098
14294 : C600F72A32BE29BD = 955
14302 : 10BE29BD39C600F7 = 938
14310 : 27C0F729E38D32F6 = 1185
14318 : 27C0C10:1027FE0B = 744
14326 : 7C383B17FF0B17FF = 805
14334 : 1AF62A45C1011027 = 632
14342 : 03BA1747FBB60155 = 802
14350 : 8:DF:027FE27D601 = 883
14358 : 53B1EF1027FEB320 = 923
14366 : CEDF29BE10BF29BD = 1062
14374 : 30BB3FBF29C1B6FF = 1061
14382 : A784 17FC00BE29BB = 992
14390 : 10BE29BD39BF293B = 912
14398 : 10BF29BDBE29C1F6 = 1107
14406 : 29BFE609BE29C131 = 848
14414 : 8467A46YSF4326F9 = 930
14422 : 3C1FBF29C15AF729 = 882
14430 : BFC1002711301FA6 = 685
14438 : 848100262 1BE29BB = 750
14446 : 108E29BD2085301F = 6E0
14454 : A684B10026103001 = 530
14462 : B600A784BE29BB10 = 867
14470 : BE29BD16FD773061 = 880
14478 : B600A784:7FB77EE = 1016
14486 : 2A29B600C608A7E4 = 722
14494 : 30BB205A26FBB600 = 726
14502 : B72A3?F62A3F5AF7 = 763
14510 : 2A3FC:001027010F = 367
14518 : BE2A403002BF2A40 = 643
14526 : AE9F2A44010BE09E4 = 834
14534 : 108F2A27C607A6D4 = 795
14542 : A7A431AB2030BB20 = 796
14550 : 5A26F3AE9F2A40B6 = 944
14558 : 00C607A7B4308020 = 720
14566 : 5A26FE868FB729B6 = 1059
14574 : 10EE29A4312A10BF = 709
14582 : 29A4B629AB4C3109 = 813
14590 : 2E10B729A9108E07 = 622
14598 : 64B629AB17F37D16 = 907
14606 : 00ABB600B729AB10 = 716
14614 : BE0764B629AB17F3 = 905
14622 : 6BB629AA4CB1092E = 740
14630 : 1CB729AA108E0763 = 674
14638 : B629AA17F3561600 = 767
14646 : 848600B729AA108E = 818
14654 : 0763B629AA17F344 = 833
14662 : 0629A94CB1092E10 = 668
14670 : B729A9108E0762B6 = 838
14678 : 29A917F32F16005D = 638
14686 : B600B729A9108EC7 = 692
14694 : 62B629A917F31DE6 = 967
14702 : 29AB4CB1C92E0D10 = 493
14710 : BE0761B629AE17F3 = 903
14718 : 0B1600398600B729 = 448
14726 : AB108E0761B629AB = 821
14734 : 17F2F9B729A9108E = 1065
14742 : 0762B629A917F2E2 = 998
14750 : B729AA108E0763B6 = 840
14758 : 29AA17F2DFB729A9 = 1094
14766 : 108E0764B629AB17 = 682
14774 : F2D2B729A9BE29BB = 1265
14782 : 10BF29BD16FC390C = 905
14790 : 08A0B60010BE1560 = 577
14798 : A7BD313F108C0000 = 563
14806 : 26F6109E29A431A9 = 913
14814 : 00C3103F29A4B629 = 835
14822 : AA4C4CB1092E0CB7 = 701
14830 : 29AA108E076317F2 = 740
14838 : 93206E8106272086 = 633
14846 : 31B729AA108EC763 = 659
14854 : 17F2B1B629A94CB1 = 791
14862 : 092E0CB729A9108E = 518
14870 : 076217F26F204AB6 = 721
14878 : 00B729AA108E0763 = 658
14886 : 17F261B629A94CB1 = 959
14894 : 092E0CE729A9108E = 618
14902 : 076217F24F207AB6 = 457
14910 : 00B729AB108E0761 = 654
14918 : 17F241B729A9108E = 881
14926 : 076217F2373729AA = 819
14934 : 108E076317F220D7 = 757
14942 : 29AB108E076417F2 = 742
14950 : 23B629BA4CB729BA = 530
14958 : B1032E11BE:B1C10 = 408
14966 : BE2B0BBF29DB10BF = 819
14974 : 29BD16F9FF8601B7 = 1074
14982 : 29BA10BE29C531A9 = 889
14990 : F1D410BF29C51C8C = 1067
14998 : 01702D1.BE1B1C10 = 420
15006 : BE2B0BBF29ED1CBF = 819
15014 : 29BD:AF9D710BE01 = 875
15022 : 9010BF29C5BE1D1C = 786
15030 : 19BE280BBF29BB10 = 644
15038 : BF29BD16F9BEF62A = 1170
15046 : 34C1002704C10127 = 521
15054 : 28F62A395AF72A39 = 821
15062 : C10027013 9BF2A35 = 576
15070 : BE2A2930B900B1C6 = 785
15078 : 01F72A348AFFA784 = 1030
15086 : BF2A3717FBF1BE2A = 1032
15094 : 35BF2A3510BF2A3C = 648
15102 : BE2A37F62A33B60B = 768
15110 : B72A3E3184 66A466 = 836
15118 : 21B62A3E4AD72A3E = 680
15126 : 810026F13001BF2A = 690
15134 : 375AF72A33C10027 = 717
15142 : 043E2A3539C616F7 = 813
15150 : 2A33C600F72A34C6 = 830
15158 : 33F72A393001A6B4 = 744
15166 : 8100260A8600301F = 390
15174 : A784BE2A35398600 = 775
15182 : 30.FA784B629B349 = 854
15190 : B729B310BE075017 = 671
15198 : F12AC60BBE29BBB6 = 1044
15206 : 00A7B430BB205A26 = 643
15214 : FB30B9FEA1C60BA7 = 1224
15222 : 8430BB205A26FB30 = 772
15230 : B9FEA1C60BA78430 = 1108
15238 : BB205A26FBCA0BBE = 943
15246 : 29BB3001108E29EF = 715
15254 : A6A0A73430BB205A = 931
15262 : 26F617FB690E0BA0 = 970
15270 : B600108E1560A7B0 = 704
15278 : 313F108C000026F6 = 552
15286 : B601B72A4239C601 = 682
15294 : F72A453910BE29A4 = 826
15302 : 108C29A62B22E629 = 713
15310 : A8BE29ADA7B0B629 = 1042
15318 : A9A7B0B629AAA7B0 = 1152
15326 : B629ABA7B0B629AC = 1084
15334 : A7B0BE29A4BF29A6 = 1088
15342 : :77959EE0400B6AF = 688
15350 : A7B0BCC6002DF78E = 877
15358 : 0466108E2A4AC610 = 594
15366 : A6A0A7B05A26F9B6 = 1180
15374 : 29AEBB70A7B0B629 = 978
15382 : A9BE70A7B0B629AA = 1108
15390 : EB70A7B0B629ABBA = 1075
15398 : 70A7B0B629ACBB70 = 1053
15406 : A7B4BE04A610BE2A = 811
15414 : 5AC610A6A0A7B05A = 1015
15422 : 26F9B629A0AB70A7 = 1101
15430 : B0B629AEBB70A7B0 = 1071
15438 : B629AFBB70A7BCB6 = 1126
15446 : 29B03B70A7B0B629 = 986
15454 : A1BB70A7B40C0C26 = 912
15462 : 108E2A6AC615A6A0 = 851
15470 : A7B05A26F9C60586 = 1009
15478 : 00BE29ABA7E43001 = 679
15486 : 5A26F91743E2815Y = 815
15494 : 26F9:6EE9B39 = 759
```

BUG BURST

WE CALLED THIS GAME Bugburst because the bugs all originate from a point in the middle of the screen, from where they appear to burst forth in increasingly annoying numbers throughout the game.

Speed is maintained with machine code and there is a total of 15 different screens. These are produced by multiplying small seed strings up into full-screen-sized-lumps, thereby achieving great compression and reducing the program length and hence the typing effort. The common objective to all the screens is to get rid of or paint over anything that is seen to be flashing by guiding your man across it.

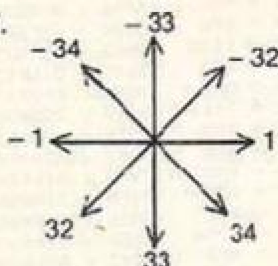
There are, of course, many obstacles to make this task more interesting! We feel that the game benefits from the same underlying psychology that contributes to the evergreen appeal of Pac-Man, this being the part of human nature that compels one to tidy things up, whether by gobbling up dots or by filling-things-in to give a nice even appearance.

The bugs are not guided towards the player, nor do they follow fixed paths, but they do have certain habits which you may be able to detect and pick up as you play, although even these vary between screens.

To facilitate the movement of many bugs by the machine code, a direction table is used. This holds preset values which, when added to a bugs present screen position, will move the bug in any of eight directions. The values are as in table 1.

Each bug is well looked after, with its own personal store which includes a pointer to keep track of its present position along the direction table. After a certain number of bug

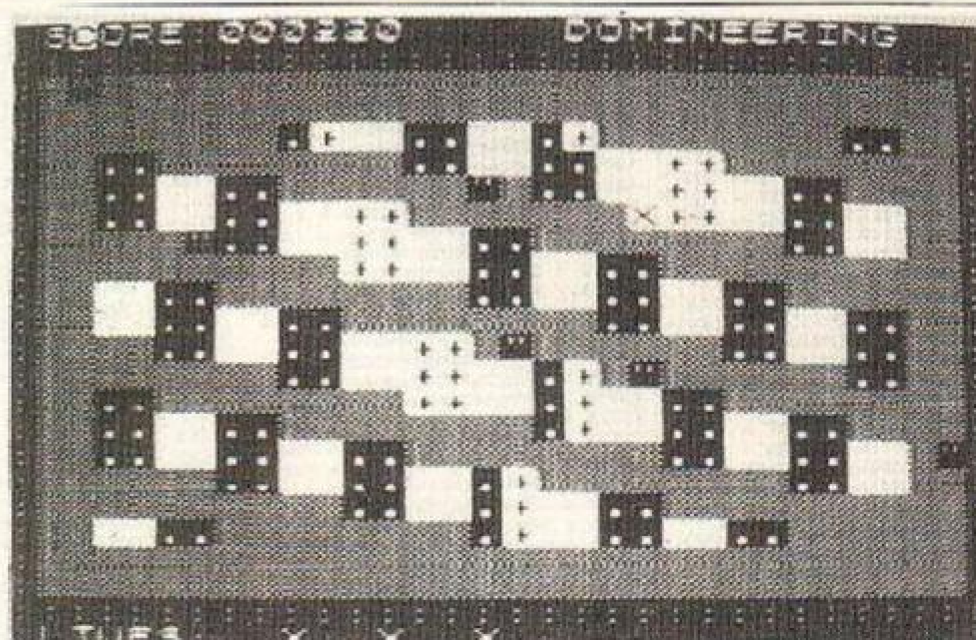
Table 1.



moves in a given direction this pointer gets shifted along the table by a random number of steps thereby changing the bugs' direction — the shifts are modulo eight i.e., a shift beyond position made before a bugs direction gets changed is controllable from Basic. For example, on screen eight it is set to 99 and, since the screen width is far less than this, the bugs tend to travel in straight lines and only change direction when they hit a wall or another bug, whereas on screen the bugs change direction after only four moves and therefore show a more unpredictable behaviour.

The limiting condition is reached on screen 7 where the bugs change direction *every* time they move, so although they don't disperse quite as quickly, they *are* highly dangerous to be anywhere near!

If, instead of being randomly stepped, the direction pointers are scanned along the table in *fixed* steps, then synchronised movement patterns can be produced for large numbers of bugs, and this fact is made good use of in the intro-screen displays, or 'Bugdances' as we've




```
   7 REM :BY:J.DAVE.ROGERS/COLIN
HOGG/LIVERPOOL/1984
   8 RUN 700
   9 REM -----NORMAL-MOVES------>
  10 LET NP=S+M(CODE INKEY$+1)
  20 LET M=PEEK NP
  30 IF M<>0 THEN IF M<>FIL THEN
 GOTO 80/(120 AND M=0)+120 AND (
M=F1 OR M=F2))
  40 POKE NP,61
  50 POKE S,PEEK 16439
  60 POKE 16438,M
  70 LET S=NP
  80 GOTO USR 16545
  90 REM (GOES TO 10,300 OR 600)
 100 LET M=FIL AND USR 16721
 110 GOTO 40
 200 REM --DROP-THROUGH-SPACE-->
 210 POKE S,PEEK 16439
 220 POKE NP,61 AND USR 16545
 230 POKE 16438,CODE ""
 240 LET S=NP
 250 LET NP=NP+33
 260 GOTO 210-(190 AND PEEK NP)
 300 REM ----SCREEN-CLEARED---->
 310 LET LIF=LIF+(LIF<8)
 320 PRINT AT SN+3,0;J$+"CLEAR,P
LEASE PRESS [illegible] TO PROCEED-"+U$;AT
 SN+4,19;"P";TAB 31;">"
 330 IF INKEY$<>"P" THEN GOTO VA
L "320"
 340 LET SN=(SN AND SN<15)+1
 350 PRINT AT 1,0;C$;AT 23,6+3*
LIF;CHR$ 189
 360 IF SN=1 THEN LET BMF=1+(BMF
=1)
 370 LET X$=S$(SN)
 400 REM ---EXTRACT INFO FROM X$
AND BUILD NEXT SCREEN---------->
 410 LET F1=CODE X$(1)
 420 LET F2=CODE X$(2)
 430 LET FIL=VAL X$(3 TO 5)
 440 LET BN=VAL X$(6 TO 7)*BMF
 450 LET BT=VAL X$(8 TO 9)
 460 LET BSK=VAL "139-11*(SN=2)"
 470 GOSUB 7000
 480 LET A$=X$(23 TO )( TO VAL X
$(10 TO 11))
 490 LET A$=A$+A$
 500 IF LEN A$<512 THEN GOTO 490
 510 FOR N=1 TO 512 STEP 32
 520 LET A$(N TO N+31)="[illegible]"+A$(
N+2 TO N+27)+"[illegible]"
 530 NEXT N
 540 PRINT AT 0,10;X$(12 TO 22);
AT 2,0;O$+J$+A$( TO 512)+O$+J$
 550 LET S=VAL "49+PEEK 16396+25
6*PEEK 16397"
 560 POKE S,189
 570 POKE 16438,CODE U$
 580 IF D$<>"D" THEN GOTO 10
 585 REM --------DEMO-MODE---->
 590 PRINT AT 23,1;"[illegible]"
 591 FOR D=1 TO 16 STEP 0.25
 592 IF USR 16545 AND INKEY$<>""
THEN RUN
 593 POKE S,189+(D=INT D)
 594 NEXT D
 595 GOTO 6000
 600 REM -------PLAYER-HIT----->
 610 LET LIF=LIF-1
 620 FOR N=1 TO 10
 630 POKE S,CODE "[illegible]"(N)
 640 PRINT AT 23,6+3*LIF;("[illegible]
[illegible]"(N TO N+2))
 650 NEXT N
 660 IF LIF THEN GOTO 550
 670 PRINT AT 21,0;" WOT,NO LIVE
S LEFT ? ";TAB 4;" PRESS ""P"" T
O PLAY AGAIN ";AT 21,0;G$+(U$ AN
D RND>RND)
 680 IF INKEY$<>"P" THEN GOTO VA
L "670"
 690 CLEAR
 700 REM -----INITIALISE------>
 710 FAST
 720 IF PEEK 16799<>172 THEN GOT
O 8000
 730 LET H=VAL "0"
 740 LET NP=H
 750 LET S=H
 760 DIM M(64)
 770 LET FIL=H
 780 LET DAN=INT (RND*13)
 790 LET SN=H
 800 LET BMF=H
 810 POKE 16418,H
 815 POKE 16419,255
 820 LET K$="Z-01/X-01/?001/V001
/N033/M033/J-33/K-33/5-31/6033/7
-33/8001/:-02/?002/)066/+-66"
 830 FOR N=1 TO LEN K$ STEP 5
 840 LET M(CODE K$(N)+1)=VAL K$(
N+1 TO N+3)
 850 NEXT N
 860 REM ALL GREYS,EXCEPT IN LIN
E 1110, ARE G-SHIFT-A.
 870 LET J$="[illegible]"
 880 LET U$="[illegible]"
 890 LET O$="[illegible]"+J$+J$+J$+"[illegible]"
 900 LET C$=U$
 910 LET F$=U$
 920 FOR N=1 TO 21
 930 LET C$=C$+U$
 940 LET F$=F$+"[illegible]"+J$+J$+
"[illegible]"
 950 NEXT N
 960 DIM S$(15,96)
1000 REM ----SCREENS-DATA----->
1010 LET S$(1)="++155060410[illegible]"
1020 LET S$(2)="[illegible]005062010[illegible]"+U$
1030 LET S$(3)="[illegible]7*RND100524[illegible]"
1040 LET S$(4)="/10,1121734[illegible]"+J$+"[illegible]"+J$
1050 LET S$(5)="TY003162063[illegible]"
1060 LET S$(6)="()9*RND201700[illegible]"
1070 LET S$(7)="VV0,1090130[illegible]"
1080 LET S$(8)="OC008120041[illegible]C"+U$+"C[illegible]OC0[illegible]C"+J$+"C[illegible]OC0[illegible]C"+J$
1090 LET S$(9)="[illegible]0,1150625[illegible]"
1100 LET S$(10)="[illegible]145162726[illegible]"
1110 LET S$(11)="..090100460[illegible]"
1120 LET S$(12)="[illegible]003140764[illegible]"
```

called them. These consist of 10 different pre-selected dances which are normally displayed in sequence, but keys 0 to 9 let you watch any particular one.

We found that the most organised-looking dances were produced when both the "dance floor" and the number of bugs taking part were *square* — by a square number we mean 4, 15 etc — and all bugs were started off in the exact centre. Some of the patterns remain infinitely stable and repeating, but others remain symmetrical only for a while and then decay into apparent chaos — such is entropy.

Similar to barndances

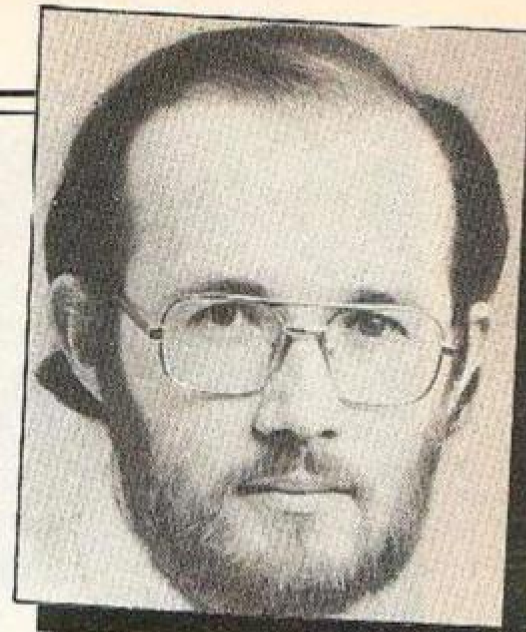
Some are vaguely reminiscent of Barn-dances, while in dance number two for some reason one bug gets thrown out of the main pattern and circles dejectedly on its own in a corner! All this illustrates how unexpectedly complex behaviours can evolve out of relatively simple rules, in a similar — though infinitely less lengthy — way that organisms have arisen from fundamental chemistry.

Addresses summary — or where things live in the program:

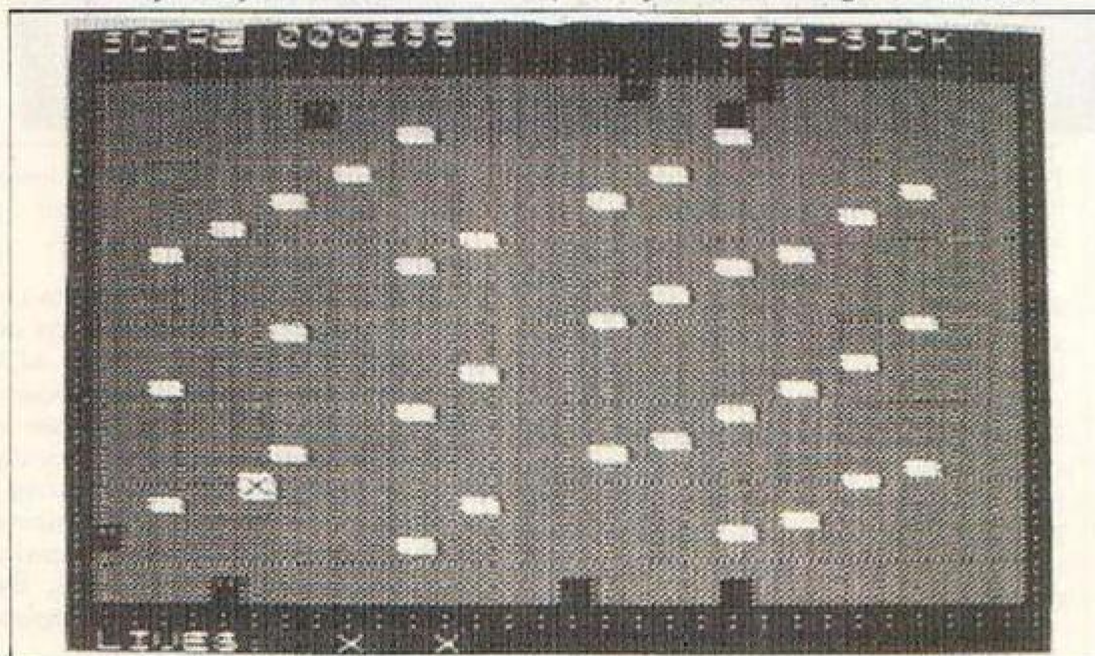
The Peeks, Pokes, Usr calls and other uses of memory in this program fall into groups.

Spare memory locations being used as "variables" because the parameter represented is used by both the Basic and the machine code: Being at a fixed address allows easier access by the machine code rather than having to search through for variables.


Colin Hogg


Dave Rogers.

Colin Hogg and Dave Rogers burst bugs.



Parameter	Intermediate Variable	Poked into address.
Flash characters	F1/F2	16507/16508
No of active bugs	BN	16417
Bug turning distance	BT	16703
Bug 'stopped' character	BSK	16708
Chr$ replaced after player	—	16438
Score ripple count	(initialised by line 6050)	16439

Machine-code subroutines: The machine code starts at 16514 and ends at 16770.

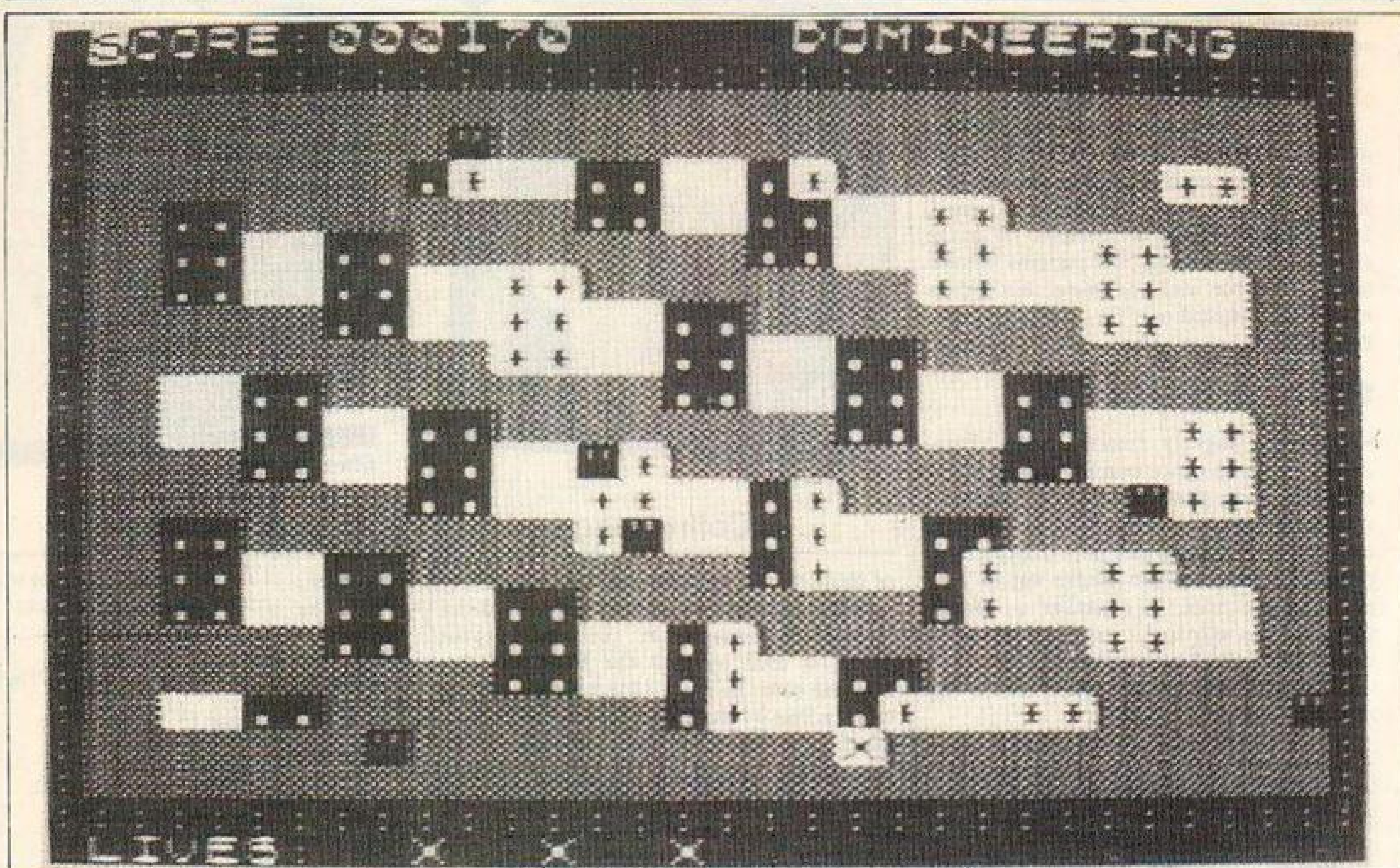
USR 165514 Sets up all bugs at the start position, centre of screen.

USR 16721 screen — formats with leading zeros and also scans along the word "score" to give ripple effect.

USR 16545 Main bug-move routines (a) Moves all active bugs once. Bugs can move onto any characters except spaces (0) or inverses — greater than 127. (b) Scans screen for characters "F1/F2" and swaps one for the

(continued on next page)

```
 <        >          H
 <"
1130 LET S$(13)="[illegible]1512310[illegible]
1140 LET S$(14)="0020620305[illegible]
[illegible]0C0000=  [illegible]"+J$+"
          000"
1150 LET S$(15)=".,155241230[illegible]
[illegible]...[illegible]..."+J$+"[illegible]
2000 REM ----DISPLAYS/INTRO--->
2010 POKE 16710,100
2020 POKE 16713,7+(INT (DAN/2)=D
AN/2)
2030 POKE 16714,0
2040 LET F1=CODE "■"
2050 LET F2=CODE "+"
2060 LET BN=40
2070 LET BT=2
2080 LET BSK=11
2090 GOSUB 7000
2100 LET T=11
2110 GOTO 4000
2500 PRINT AT 2,6;"HOGROGPROG PR
ESENT:";AT 23,0;W$
2510 FOR N=1 TO 24
2520 PRINT AT 11+(N AND N<12),11
;"[illegible]BURST";AT 11,11;"BUG[illegible]"
2530 IF INKEY$="" THEN NEXT N
3000 LET I$="12005/20003/20015/4
0909/50802/71606/43209/71602/216
03/53210"(1+DAN*5 TO )
3010 POKE 16713,VAL I$(1)
3020 LET BN=VAL I$(2 TO 3)
3030 LET BT=VAL I$(4 TO 5)
3040 LET BSK=148-20*(RND>RND)
3050 GOSUB 7000
3060 LET DAN=(DAN+1 AND DAN<9)
3070 LET T=100
4000 SLOW
4010 PRINT AT 0,0;F$+L$+"/PRESS
P TO PLAY,0-9 FOR DANCES/"
4020 FOR N=1 TO T
4030 IF USR 16545 AND INKEY$=""
THEN NEXT N
4040 LET K$=INKEY$
4050 IF K$="P" OR K$="D" THEN GO
TO 5000
4060 IF K$>"9" OR K$<"0" THEN GO
TO VAL "2000+(500 AND T=11)"
4070 LET DAN=VAL K$
1080 PRINT AT 20,0;W$;AT 23,15;K
$
4090 GOTO 3000
5000 LET E$="--------------------
-------------"
5010 CLS
5020 PRINT E$+"[illegible]
","IF IT MOVES,SALUTE IT","IF IT
 DOESNT,WHITEWASH IT",E$+"[illegible]
[illegible]","IF IT MOVES AVO
ID IT","IF IT FLASHES,FILL IT IN
5030 PRINT E$+" EACH OBJECT FIL
ED = 2 POINTS   ALL OBJECTS FILL
ED = NEW SCREEN"
5040 PRINT E$+"[illegible]",,"
Z OR X LEFT",,"C OR V RIGHT",,"N
 OR M DOWN",,"J OR K UP",E$
5050 PRINT " SHIFT Z,C,M,K GIVES
 DOUBLE HOP",E$+E$+E$+E$+E$+E$;A
T 19,7;" ""D"" FOR DEMO MODE ";A
T 14,2;"OR 5,6,7,8"
5060 LET P$="[illegible]"+E$( TO
 18)
5070 LET P$=P$+P$+P$
5080 LET P$=P$(64)+P$( TO 63)
5090 PRINT AT 21,0;P$
5100 LET D$=INKEY$
5110 IF D$<>"S" AND D$<>"D" THEN
 GOTO 5080
6000 REM -------START-GAME----->
6010 POKE 16712,253
6020 POKE 16713,134
6030 POKE 16714,52
6040 PRINT AT 0,0;"[illegible]000000
[illegible]"+C$+"[illegible]
6050 POKE 16439,1
6060 LET LIF=5
6070 GOTO 340
7000 REM -------RESET-BUGS------>
7010 POKE 16507,F1
7020 POKE 16508,F2
7030 POKE 16417,BN (40 BN AND BN
<40)
7040 POKE 16703,BT AND USR 16514
7050 POKE 16708,BSK
7060 RETURN
8000 REM ---POKE-IN-M.CODE---->
8010 IF PEEK 17038<>118 THEN PRI
NT "FIRST REMS WRONG LENGTH";END
8020 POKE 16510,0
8030 POKE 16511,14
8040 POKE 16512,2
8050 POKE 16513,118
8060 LET H$="2A0C4011 7B0119E5
21A04106 23360423 3608233C E6077
723 73237223 10EFC92A 0C400105 0
0090110 02ED5B7B 407EDBC2(20082)
"
8070 LET H$=H$+"B84072C3 BD40BAC
2 C14073FD 35420023 0BAFB0B1 C2A
F4001 2C01FD2B 4226D0FD 7270FD73
 7C3A2140 21A04111 3C400105(2555
6)"
8080 LET H$=H$+"[illegible]
D 0241E1D1 C1F1ED80 EB3DC2DD 430
E0AFD CB412630 0158002C9 FD353CCC
 3C412103 413A3E40 CB27856F(3190
6)"
8090 LET H$=H$+"4E23462A 3F403A3
D 4077007E FE7ED23C 41A7CA3C 41F
E3DC2 3341FD36 41803A36 40368832
 3D40223F 403CFD36 3C042A3F(3645
1)"
8100 LET H$=H$+"4030003A 3E40FD0
6 34E60732 3E40C93E 8E06002A 0C4
0E5FD 45370090C CBFE23BE 2004C88E
 0E01FD71 377EEE80 770:3EA5(4155
1)"
8110 LET H$=H$+"CD794121 0D0019E
E 2005359C 2810F034 C9DFFFE0 FF0
10022 03210020 00FFFFDE FFA62420
 AD84AC37 B4ACB5B7 B4AC(47116)."
8120 LET T=0
8130 FOR A=16514 TO 16799
8140 POKE A,16*CODE H$-CODE H$(2
)-476
8150 LET T=T+PEEK A
8160 LET H$=H$(3+(H$(3)=" ") TO
)
8170 IF H$(1)<>"0" THEN NEXT A
8180 IF STR$ (T+A)<>H$(2 TO 6) T
HEN PRINT "ERROR,CHECK LINE THAT
 ENDS WITH:",H$( TO 7),END
8190 LET H$=H$(8 TO )
8200 NEXT A
8210 PRINT "M-CODE OK.SAVE A FEW
 COPIES NOW";END
9000 REM ---------AUTOSAVE------->
9010 CLEAR
9020 SAVE "B■" J.D.ROGERS/C.HOGG
9030 IF INKEY$="" THEN RUN
9999 REM SAFETY NET:[illegible]
```



(continued from previous page)
other to produce animation. If *none* of either character are found then returns to Basic with '300' thereby routing the program to the 'cleared screen 'routine'. (c) If any of the bugs has hit the players character, then returns to Basic with 600. (d) Otherwise returns to line 10 to continue main loop.

Direction table: From 16771 to 16786. Sixteen bytes, holding eight two-byte numbers.

Individual bugstores: From 16800 to 17000. Two hundred bytes, consisting of 5 bytes of information on each of 40 bugs. Each store is arranged in the order:- Move count — so as to know when to turn replacement Chr$, direction pointers, and finally, screen position — 2 byte number.

Information on one bug gets moved from its store onto a workspace where the main bug-move routine operates on it, moves the bug, then replaces the new values of bug position, etc, back into that bugs store, ready for the next time it gets moved. This procedure is then repeated for as many bugs as are active at the time.

Pokes to actually *alter instructions* within the machine code:

Poke 16712,	198	253
Poke 16713,	1 to 8	134
Poke 16714,	0	52
	For fixed bugstep	For pseudo-random bugstep

ZX-81 System variables:

Peek 16396/7 Finds address of display file.

Poke 16418,0 Sets up 24-line screen.

Poke 16511/2 Turns the five short Rems initially typed in into one long Rem — to hold the machine code — by changing the "line length" indicator bytes.

Poke 16510,0 Makes this line unerasable and secure.

Poke 16513,118 Prevents the unstoppable "endless-listing" crash that afflicts the ZX-81 when the first Rem line is very long.

Checks: Peek 17038 checks that the first five Rems are of correct *overall* length before the program attempts to poke things into them — looks at where there should be a Newline character at the end of the fifth Rem line. Peek 16799 Looks at the *last* byte where there should be machine code, to see if it has all been Poked-in yet, if not then Runs the hexloader — the latter may need to be Run several times so as to uncover errors in the data.

Although this is an all-in-one listing that can simply be typed in and Run, we cannot recommend too highly that you still work in stages, by typing in say 50 lines then saving onto tape, type in the next 50, save again *without* rewinding and so on. This way, if a mains supply spike or other gremlin causes a crash you will always have the previous stage available from tape, and will thereby avoid much swearing, frustration and kicking-of-the-cat.

The Rems for the machine code must be entered by typing in line 1 plus exactly 100 characters, then editing its line number to 2, 3, 4 and 5, resulting in five identical lines.

All grey characters are Graphic-Shift-A. The one exception is line 1110 where the grey on key H is used.

Line 520 Inverse colon, greys.
Line 640 All graphic shift: 6,7,6,G,F,G,F,J, Four inverse spaces.
Line 670 Nine greys.
Line 680 32 Inverse colons.
Line 690 Inverse colon, three greys, inverse colon.
Line 2520 Words 'Bug Burst' (parts inverse).
Line 6040 Inverse space, inverse word 'Score', *inverse colon*, six inverse zeros, inverse spaces. Second string is: Inverse space, inverse word 'Lives', inverse colon, eight * (two inverse spaces, inverse X), inverse space.

Take great care entering lines 1000 to 1150, count all spaces and numbers of greys carefully. Each of these lines contains *all* the information that is needed to produce a particular screen of the game. In case you can't read the inverse screen titles, they are as follows — each has some logical bearing on the screen or its animation: Domineering, Seasick, Gridscreen, Stairtapper, Octodrop, Clappertrap, Medieval, Squasiboxes, Escalation, Grey Lagoon, Pac Who?, Grateplanez, Sgts. Steps, Wheelies, Lazy Doms.

Line 1020 includes graphic-shifted S and D.
Line 1030 includes graphic-shifted 3 and D.
Line 1090 includes graphic-shifted W and Q.
Line 1100 includes graphic-shifted F and G.
Line 1120 includes graphic-shifted E and R.
Line 1130 includes graphic-shifted V and M.
Line 1070 includes inverse X's.

When the program is Run for the first time, the hexloader will Poke the machine code into the Rems. If necessary you must correct any mistakes as indicated by the error messages and Run again until eventually a Run produces the message 'O.K.', whereupon you should immediately make some back-up copies *before* Running again, this time to debut the Basic. Once absolutely sure that all is well you can erase the hexloader — lines 8000-8210 — and make several "final" copies, *this time using the Autosave* — Go to 9000.

■Ready taped versions of this program are available for £2.50 from: Hogrogprof, 11 Carnarvon Road, Walton, Liverpool L9 1EB.

YES!

"On-board" microprocessor

Electro magnet to pull motor spindle onto tape.

Nine track "byte-wide" head

Tape drive spindle.

Precision ground rubber pressure roller.

Twelve foot long loop of tape freely packed into cartridge.

PHLOOPY 100k cartridge, shown not yet pushed fully home.

A 100k BBC-drive for £99 + VAT

We've done it! We've built a storage system for your BBC Micro with the power and convenience of a floppy disk drive, at a fraction of the price. Interface to the BBC costs £26 + VAT and runs up to 8 drives.

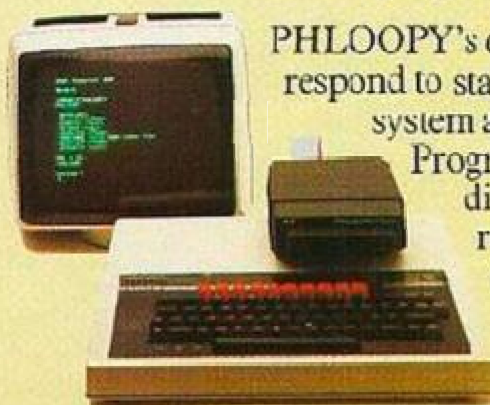
PHLOOPY's special secret

PHLOOPY does not record on a disk, but on a loop of quarter-inch tape contained in a rugged interchangeable cartridge.

The heart of PHLOOPY is a unique "byte-wide" magnetic head, that gives it its speed by recording nine tracks across the tape. Typically, you can access a file in only 3 or 4 seconds.

If you're used to waiting for a cassette tape to trundle programs into your BBC, you'll be amazed at PHLOOPY's performance – up to 100 times faster.

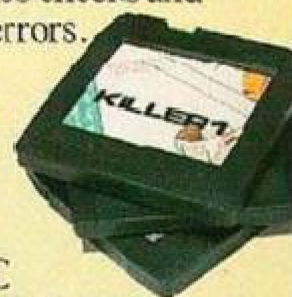
Talking to your PHLOOPY



PHLOOPY's own software makes it respond to standard BBC filing system and Basic commands. Programs written to run on disk or cassette should run on PHLOOPY without problem.

And because your PHLOOPY drive contains its own microprocessor – a second computer which does most of the hard work – it puts very little load on the BBC. The on-board computer also checks and automatically corrects any read errors.

Your PHLOOPY Library



PHLOOPY cartridges hold a full 100k of data. You can buy blank cartridges for £3.75 each plus VAT. Many BBC programs will be available on PHLOOPY.

Phi Mag Systems Ltd. PO Box 21, Falmouth, Cornwall TR11 3TD Tel: (0326) 76040

Order Form

- Please send me further details about the PHLOOPY 100k data storage system for the BBC Model B.
- Please send me______(qty) PHLOOPY starter pack(s) for my BBC Model B microcomputer, including PHLOOPY drive, BBC interface, leads, connections, operating system in firmware, manual, and two PHLOOPY 100k cartridges, at £147.75 each including VAT, postage and packing. Amount £______
- Please send me______(qty) packs of 5 PHLOOPY cartridges at £19.75 including VAT, postage and packing. Amount £______

I enclose a cheque/PO for £______ OR Please debit my Access card Number: ______

Your order will be acknowledged within 10 days, giving a delivery date

Name______

Address______

Town______ Post code______

Send this coupon to Phi Mag Systems Ltd, PO Box 21, Falmouth, Cornwall TR11 3TD. Telephone: Falmouth (0326) 76040.

14 day money-back option.

YC



He needs no allies,
his strength and agility will prove him worthy of the name –
'Storm Warrior'.

Storm Warrior is a 12 screen, all machine code, fast moving graphics adventure using 58K of RAM. It features 5 levels of play, full playing demo mode and a fast loading system.

Available on TAPE at £7.95 and DISK at £9.95
COMMODORE 64

FRONT Runner
Meet the Challenge

AMSTRAD

BOMBER

Daniel Winter supplies the deserted cities — all you have to do is flatten them.

THIS BOMBER GAME is for the new Amstrad CPC—464 computer. As usual you are set the task of clearing away a city as the pretext of needing somewhere to land your stricken plane. You are equipped with an unlimited number of bombs which flatten random amounts of buildings. In desperation, to avoid collision, you can fire missiles clearing the path forward for your plane. Unfortunately, you only have nine of these so they are a last resort.

Variables.

L — Level of difficulty.
X, Y — Plane co-ordinates (tail).
D, C — Bomb co-ordinates.
A(')-A(&) — Hi-res graphic data.
B — B equals 1 if bomb is pressed.
E — E equals 1 if bomb is in the air.
S — S equals 1 if bomb hits building.
MI — Number of missiles.
SC — Score.
Q — Hi-score.
S$ (1)-S$ (5) — Highest scorers' names.
S(1)-S(5).
T & I — General-purpose variables.
R — Random height of building.

Program notes.

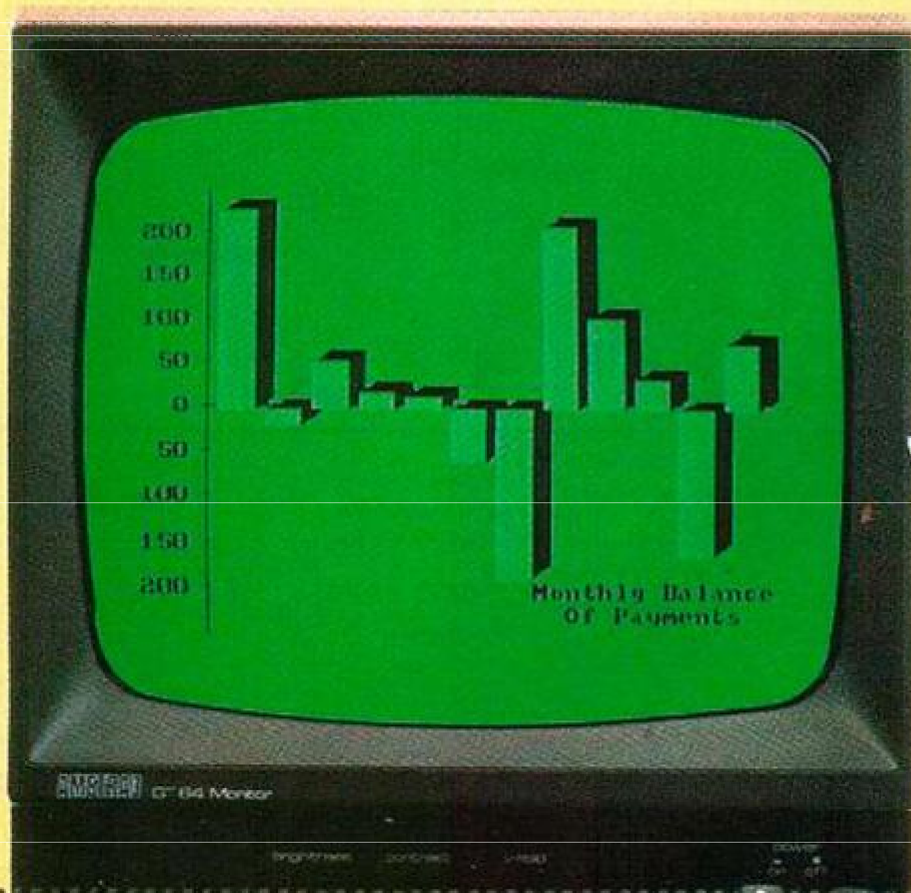
Lines 2-5 Graphics — user-defined.
Lines 10-40 Instructions and set-up.
Lines 44 Sets up buildings.
Lines 48-80 Main loop.
Lines 82-100 Win routine.
Lines 104-110 Missile.
Lines 120-126 Crash subroutine — also line 70.
Lines 128 + High-score section.

```
2 CLS:FOR G=1 TO 11
3 FOR T=1 TO 9:READ A(T):NEXT
4 SYMBOL #(1),B+A(2),B+A(3),B+A(4),B+A(5),B+A(6),B+A(7
),B+A(8),B+A(9):NEXT G
5 DATA 240,153,255,153,255,255,255,153,255,241,153,255
,181,255,255,255,199,255,242,51,218,54,,26,189,62,118,
18,243,33,132,24,9),24,1
62,16,60
6 DATA 244,128,192,224,240,255,255,127,4,245,0,0,3,4,2
55,224,252,0,246,0,0,128,64,240,63,252,4,247,0,0,0,0,0
,54,126,64,248,153,255,1
53,255,153,255,153,255,249,24,24,24,60,,26,255,129,255
,250,0,40,36,22,255,224,255,0,251,0,33,34,22,255,224,2
55,0
10 CLS:a$=CHR$(244)+CHR$(245)+CHR$(246):b$="
  144 NIGHT RAIDER                *:FOR f=1 TO 37:LOCATE f
,3:PRINT MID$(b$,f,1);a$
:FOR a=1 TO 30:NEXT:NEXT:LOCATE F,3:PRINT"   "
12 LOCATE 15,15:PRINT"Please wait":DIM b(43)
14 FOR T=1 TO 22:FOR Y=1 TO 22:K=(H*Y)/T:NEXT:NEXT
22 CLS:PRINT"You are head pilot of an R.A.F. plane   s
ent out to destroy an enemy power          station. The pl
ane is hit by flak over
mountainous range and the engine damaged The only flat
 area in sight is a small"
24 PRINT"plateau littered with deserted buildingsYour
only chance is to flatten these to make a runway for t
he pilot to land on. Can
 you do this. Remember your aircrews lives are in your
 hands. Good luck.
26 LOCATE 4,12:PRINT"CONTROLS:-  B.....BOMB":LOCATE 16
,14:PRINT"M.....MISSILE"
28 LOCATE 1,16:PRINT"You have a limit-less supply of b
ombs   but only 9 emergency missiles.

30 LOCATE 1,20:PRINT"     PLEASE INPUT LEVEL OF DIFFICU
LTY                   (1-Easy TO 10-Hard)"
32 INPUT l:IF l<1 OR l>10 THEN PRINT"TRY AGAIN (1 TO 1
0)":GOTO 32
34 PRINT TAB(50)"Press a key to begin"
36 IF INKEY$="" THEN 36
38 FOR t=1 TO 5:s$(t)="Sid":s(t)=6-t:NEXT
40 CLS
42 ENV 2,5,-3,30:mi=9:x=1:y=1:score=0
44 FOR Y=2 TO 40:R= 24-(INT(RND*(1+5))):FOR X=24 TO R
STEP-1:B(Y)=R-1:LOCATE Y,X:PRINT CHR$(248):NEXT X:LOCA
TE Y,R-1:PRINT CHR$(247)
 :NEXT Y
46 LOCATE 1,1:PRINT"SCORE:        HI-SCORE:";q:LOCATE 2
9,1:PRINT"MISSILES: 9"
48 FOR Y=2 TO 25:FOR X=1 TO 40:LOCATE X,Y:PRINT CHR$(2
44) CHR$(245) CHR$(246)
50 IF C>23 THEN LOCATE D,C:PRINT" ":LET E=0:S=0
52 A$=INKEY$
54 IF A$="M" OR a$="m" THEN 104 ELSE IF E=1 THEN A$="
"
56 IF E=1 OR S=1 THEN GOSUB 118
58 IF A$="B" OR A$="b" THEN GOSUB 112
60 IF B=1 THEN LET E=1:LET B=0
62 CALL &BD19
64 IF Y=25 THEN FOR T=1 TO 25:B(T)=26:NEXT T
66 IF C=B(D) THEN S=1:B=0
68 IF x=0 AND x=40 AND b(2)=y+1 THEN SOUND 1,302,150,1
,3,1,5:LOCATE 2,y+1:PRINT CHR$(241):CLS:GOTO 120
70 IF Y=B(X-2) THEN SOUND 1,302,150,1,2,1,5:FOR T=0 TO
 2:LOCATE x+2,y:PRINT CHR$(240+T):FOR J=1 TO 150:NEXT J:
NEXT:CLS:GOTO 120
72 IF S=1 THEN SOUND 1,200,7,12,0,0,2:SC=SC+1:B(D)=B(
D)+1:IF RND*6<0.5 THEN E=0:S=0:B=0:LOCATE D,C:PRINT" "
74 LOCATE 7,1:PRINT SC
76 IF Y=24 AND x=39 THEN x=1:FOR T=1 TO 25:B(T)=26:NEX
T T
78 IF Y=25 AND X=1 THEN LOCATE X,Y:PRINT" ":GOTO 82
80 LOCATE X,Y:PRINT" ":NEXT X:NEXT Y
82 Y=25:FOR T=7 TO 17:LOCATE T,Y:PRINT a$:FOR X=1 TO 7
5:NEXT:LOCATE T,Y:PRINT" ":NEXT:LOCATE 12,Y:PRINT CHR$
(244)
84 FOR T=1 TO 500:NEXT
86 FOR I=1 TO 8:LOCATE 13,25:PRINT CHR$(250):FOR T=1 T
O 200:NEXT:LOCATE 13,25:PRINT CHR$(251):FOR T=1 TO 200
:NEXT:NEXT
88 LOCATE 13,25:PRINT CHR$(245):FOR T=1 TO 500:NEXT T
90 Y=25:K=6
92 FOR T=12 TO 37:LOCATE T,Y:PRINT a$:FOR I=1 TO K*50:
NEXT I
94 IF K>1 THEN K=K-1
96 LOCATE T,Y:PRINT" ":NEXT
98 LOCATE 38,Y:PRINT CHR$(244) CHR$(245):FOR K=1 TO 50
:NEXT K:LOCATE 38,Y:PRINT" ";CHR$(244):FOR K=1 TO 50 N
EXT K:LOCATE 39,Y:PRINT" "

100 CLS:PRINT"     Congratulations, you made it":PLO
T 64,380:DRAW 574,380:GOTO 122
102 END
104 IF MI=0 THEN GOTO 80
106 LET M=X+3:LET N=Y:FOR I=1 TO 17:LOCATE M,N:PRINT C
HR$(247):FOR T=1 TO 5:NEXT T:LOCATE M,N:PRINT" ":IF N=
B(M) AND M<41 THEN B(M)=
B(M)+1
108 IF M>40 THEN LET N=N+1:LET M=0
110 M=M+1:NEXT I:MI=MI-1:LOCATE 37,1:PRINT MI:GOTO 72
112 IF Y>23 THEN RETURN
114 IF E=0 THEN LET B=1:H=1:LET C=Y+1:LET D=X+1:RETURN
116 RETURN
118 LOCATE D,C:PRINT" ":LET C=C+1:LOCATE D,C:PRINT CHR
$(243-H):RETURN
120 CLS:PRINT"          Oh  Dear - You  crashed":PLOT 96,
390:DRAW 490,390:t(2)=1
122 LOCATE 1,3:PRINT"You scored";sc
124 LOCATE 1,5
126 IF sc<s(5) THEN PRINT"This does not break any ":PR
INT"previously set records - Bad luck.":FOR t=1 TO 500
:NEXT:GOTO 150
128 PRINT"This ranks among the Top":PRINT"Five scores.
Please enter your name below"
130  LOCATE 9,8:PRINT"--------------------------":LOCATE 10
,10:PRINT"(Press '1' to exit)"
132 D$=INKEY$:IF D$=""THEN 132
134 IF D$="1" OR LEN(N$)>20 THEN 138
136 N$=N$+D$:LOCATE 7,8:PRINT N$:GOTO 132
138 IF sc>s(5) AND sc<=s(4) THEN s(5)=sc:s$(5)=n$
140 IF sc>s(4) THEN s(5)=s(4):s$(5)=s$(4):s(4)=sc:s$(4
)=n$
142 IF sc>s(3) THEN s(4)=s(3):s$(4)=s$(3):s(3)=sc:s$(3
)=n$
144 IF sc>s(2) THEN s(3)=s(2):s$(3)=s$(2):s(2)=sc:s$(2
)=n$
146 IF sc>s(1) THEN s(2)=s(1):s$(2)=s$(1):s(1)=sc:s$(1
)=n$:q=sc
148 LOCATE 10,10:PRINT"                    "
150 LOCATE 9,8:PRINT"  HI-SCORE PLACINGS   ":PLOT 146,2
70:DRAW 440,270:PLOT 146,266:DRAW 440,266
152 PRINT:PRINT" 1 - ";s$(1):LOCATE 34,10:PRINT s(1)
154 PRINT:PRINT" 2 - ";s$(2):LOCATE 34,12:PRINT s(2)
156 PRINT:PRINT" 3 - ";s$(3):LOCATE 34,14:PRINT s(3)
158 PRINT:PRINT" 4 - ";s$(4):LOCATE 34,16:PRINT s(4)
160 PRINT:PRINT" 5 - ";s$(5):LOCATE 34,18:PRINT s(5)
162 IF t(2)=1 THEN sc=0
164 PRINT:PRINT"Select new level: H-Higher by one":LOC
ATE 17,22:PRINT"S-Same":LOCATE 17,24:PRINT"L-Lower by
one"
165 D$=INKEY$:IF d$=""THEN 165
166 IF d$="h" OR D$="H" THEN l=l+1:GOTO 172
168 IF d$="l" OR D$="L" THEN l=l-1:GOTO 172
170 IF d$="s" OR D$="S" THEN 172 ELSE 166
172 IF l>10 THEN l=10
174 IF l<1 THEN l=1
176 n$="":GOTO 40
```

A complete workstation for the price of a home computer.



£239
Computer complete with green screen VDU (GT64)

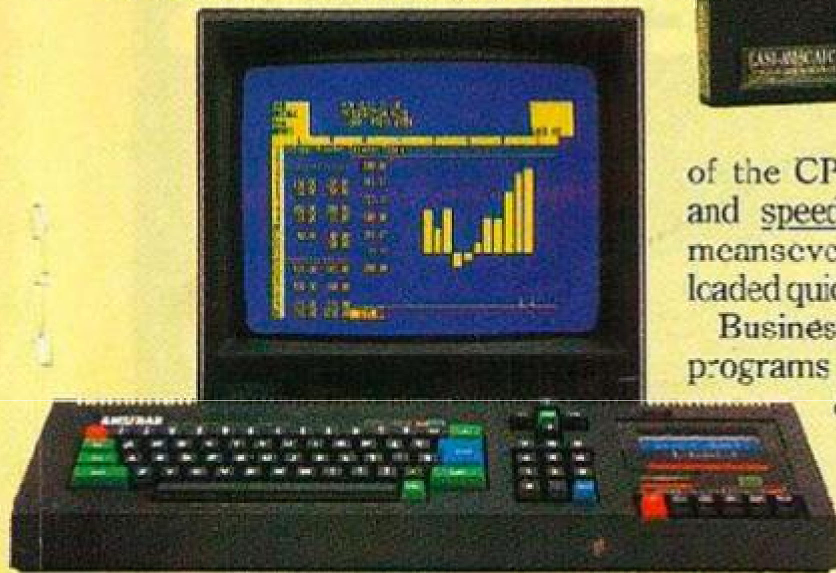
£349
Computer complete with colour monitor (CTM640)

CPC 464 complete with monitor and datacorder



It's mouthwatering.

64K of RAM, 32K of ROM, a high resolution green screen VDU, integral cassette data recorder, typewriter style keyboard, numeric keypad and a very fast extended BASIC. All for £239. (The CPC464 is also available with a colour



CPC464 colour monitor (CTM640)

monitor instead of the green screen VDU for £349 complete).

You'd be hard pressed to find a comparable computer at that price let alone the monitor and recorder.

And the CPC464 comes complete and ready-to-go. Just plug it in.

64K RAM (42K available).

The low cost but powerful CPC464 is equally at home in business and educational applications as it is running the household budget or playing games.

With 42K RAM available to BASIC, the opportunities for sophisticated and complex programming are considerable.

80 column text display.

The green screen VDU is purpose designed with a bright, crisp, 80 column text display that compares favourably with systems costing several times as much.

You can program up to 8 text windows and there's a graphics window, too.

The CPC464 has a typewriter style keyboard, large ENTRY key, sensibly positioned cursor keys, numeric keypad for fast data entry and a full 8-bit character set.

If you think that sounds impressive, wait until you hear the 3-voice, 7-octave stereo output through a hi-fi amplifier and speakers.

Amsoft. High quality software.

A wide range of programs is already available and we're expanding it rapidly. The software takes full advantage

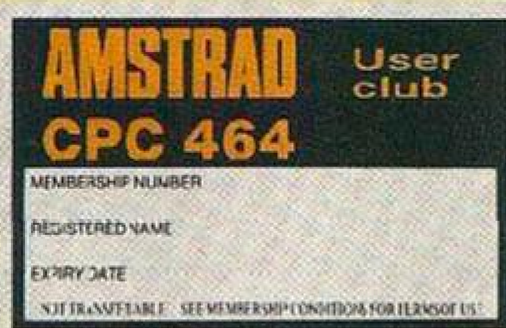


of the CPC464's high specification and speedloading capability. Which means even complex programs can be loaded quickly.

Business applications, educational programs and arcade games are all designed to make maximum use of CPC464's impressive graphics, stereo sound and processing abilities.

Amstrad. User Club.

Members enjoy immediate benefits like the privilege card, Club binder, regular magazine, competitions for



valuable prizes and contact with other Amstrad users.

Whether you're interested in serious commercial applications or simply a games fanatic, you'll want to join the Club.

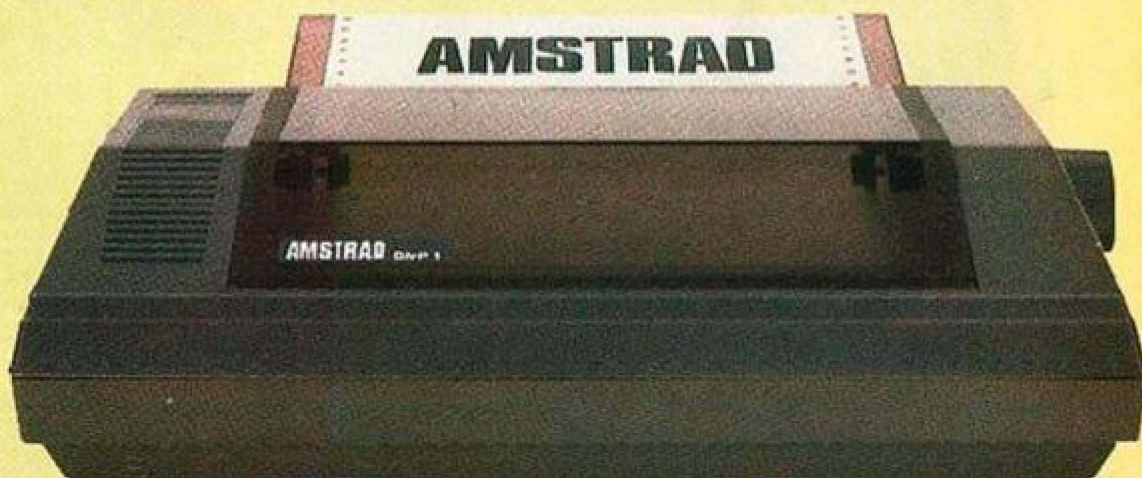
CPC464. Unlimited scope for expansion.

We've thought of everything you're likely to need in the future. That's why there's a built-in parallel printer interface. A low cost optional disk drive system including CP/M* (with the option to access 3000 programs) and LOGO. Joystick port. And the virtually unlimited potential of the Z80 data bus with sideways ROM support.

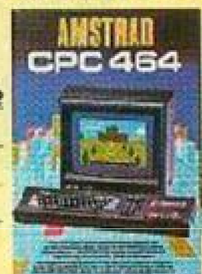
Finally, a power supply and modulator (MP-1) allows you to connect your CPC464 green screen VDU system to a colour TV.



Optional disk drive DDI-1 including interface CP/M* and LOGO £199.95



Optional 80 column dot matrix printer DMP-1 operates at up to 50 characters per second. Combined with the CPC464, it offers a high performance text processing system for only £199.95.



CHARACTER PRINT

Paul Rhodes shows you how to print characters with proportional spacing on your screen.

THIS PROGRAM ALLOWS you to display text with proportional spacing of characters on the screen or ZX Printer. It is called using the Print, LPrint, List and LList commands, as for normal printing.

The characters are printed with differing widths, depending on their shape. For example, ! is narrower than a W. The routine can be adapted to give a set number of characters per line — for example 40, 64 etc — by setting all characters to be the same width.

The program is operated via the Print #9 command — similarly for LPrint #9, List #9 etc. The only restriction is that, especially if Interface 1 is connected, functions such as CHR$ and STR$ may cause the computer to crash. This appears to be due to the ROM, as the crash occurs *before* the print routine is called. To avoid this problem, using a string as a "buffer". For example:

```
LET a$ = CHR$ n:PRINT #9;a$
```

instead of:

```
PRINT #9;CHR$ n
```

To enter the program, type in the hexloader, enter F900 or 7900 — for 48K and 16K Spectrums respectively — as the starting address, then type in the relevant hex listing for your computer. Type in End, and re-run the hexloader to enter the character set data. Replace the X in the addresses with 7 or F, depending on your RAM size, and when all the data has been entered, type in End as before. Save the code, with:

```
SAVE "PrintCode" CODE 63744,1536
```

for the 48K version or:

```
SAVE "PrintCode" CODE 30976,1536
```

for the 16K version. Then Verify it before proceeding to the next step.

Setting up channels

There is a different method for setting up the channels if your have an Interface 1 connected, so if you have, skip the next paragraph and enter listing 2. For those of you without the interface:

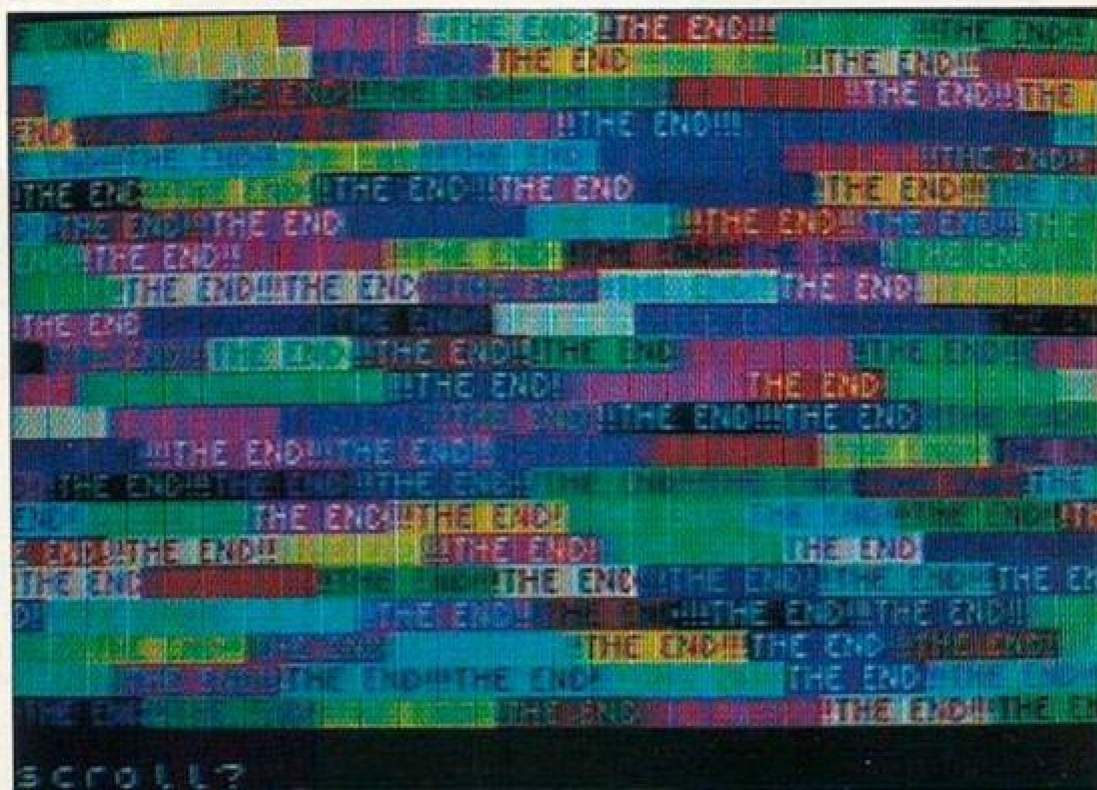
```
RANDOMIZE USR 63744 (or 30976)
```

will set up the #9 channel.

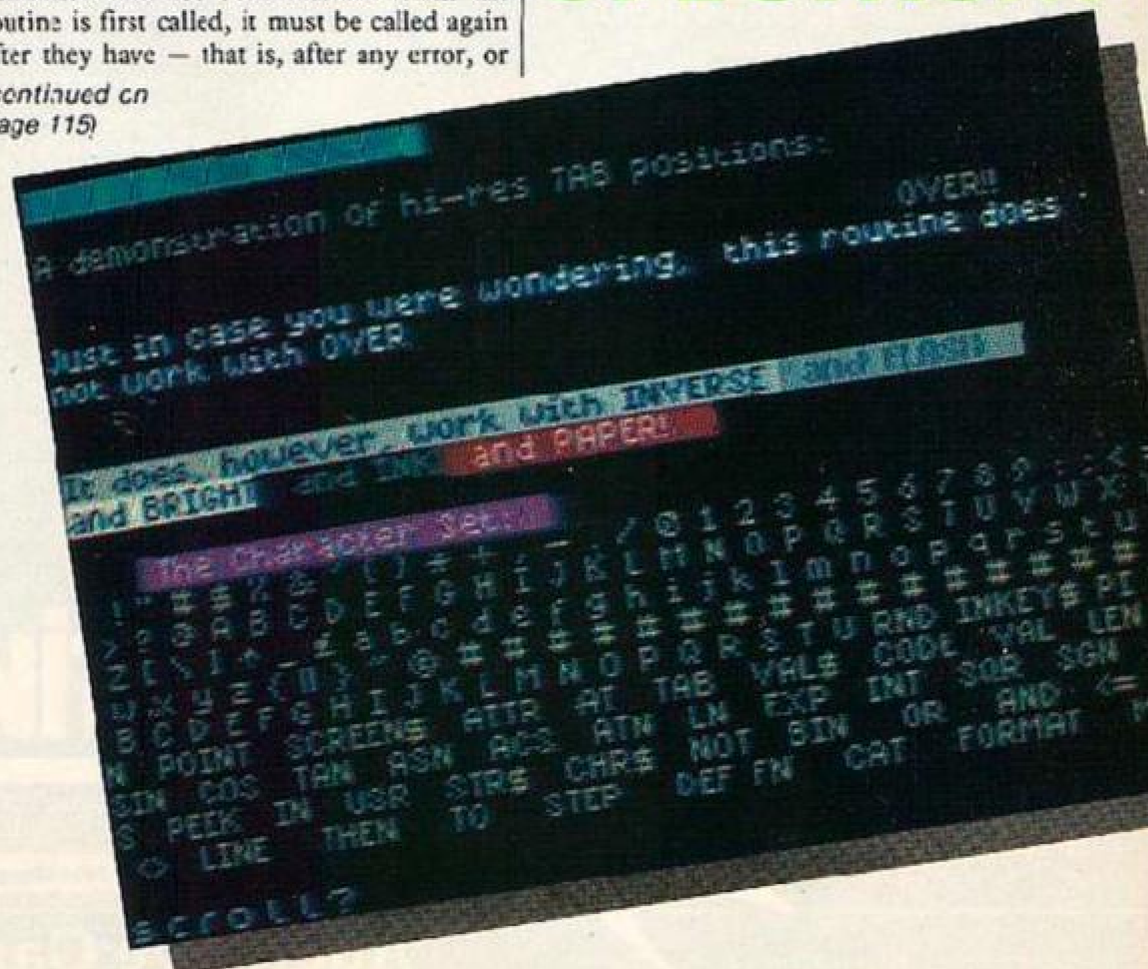
If you have an Interface 1 connected, start reading again here! Due to the way the Interface 1 affects the error routine, the above method is very risky. You can use it, but if you do the system is liable to hang up whenever there is an error, or when a Microdrive command is used — CLS# and Clear# are OK, though. So far as I know, this problem is unavoidable. An alternative method must therefore be used. Listing 2 is a subroutine which will set stream 9 to point to the Print Prog channel Data.

However, the data is not stored in the channel area, so the routine must be called again every time the Microdrives, network etc. have been used. Also, if the shadow systems variables have not been inserted when the routine is first called, it must be called again after they have — that is, after any error, or

(continued on page 115)



SPECTRUM



FOOTBALL MANAGER

It's here for the Commodore 64

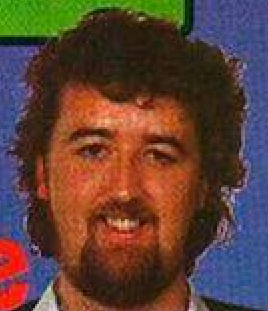
For Commodore 64

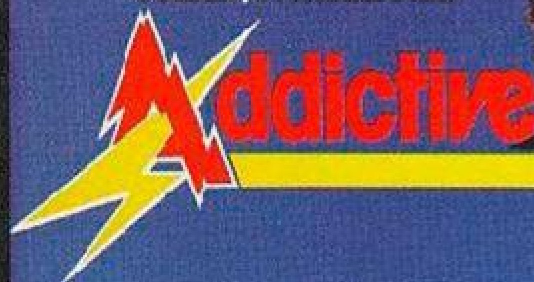
FOOTBALL MANAGER



Action from the Game

STRATEGY GAME OF THE YEAR
— Nominated —
GOLDEN JOYSTICK AWARD





KEVIN TOMS
Designer

Some outstanding features of the game

• **Matches in 3D graphics** • Transfer market • **Promotion and relegation** • F.A. Cup matches • **Injury problems** • Full league tables • **Four Divisions** • Pick your own team for each match • **As many seasons as you like** • Managerial rating • **7 skill levels** • Save game facility • **Financial manipulations** • 64 teams and customising feature • **You can even be sacked!**

POS	TEAM	F	A	PTS
1	Scunthorpe	36	14	24
2	Hull	[illegible]	[illegible]	[illegible]
3	Port Vale	[illegible]	[illegible]	[illegible]
4	Crewe	[illegible]	[illegible]	[illegible]
5	Stockport	[illegible]	[illegible]	[illegible]
6	Colchester	[illegible]	[illegible]	[illegible]
7	Rochdale	[illegible]	[illegible]	[illegible]
8	Halifax	13	18	[illegible]
9	Blackpool	18	18	10
10	Torquay	[illegible]	[illegible]	[illegible]
11	Hartlepool	[illegible]	[illegible]	[illegible]
12	Mansfield	[illegible]	[illegible]	[illegible]
13	Darlington	[illegible]	[illegible]	[illegible]
14	York City	[illegible]	[illegible]	[illegible]
15	Bury	[illegible]	[illegible]	[illegible]
16	Hereford	9	23	[illegible]

League Pos.: 10 League Match no.: [illegible]

Press SPACE BAR to continue

What people think of FOOTBALL MANAGER

"Absorbing and realistic – highly recommended" *Sunday Times, Feb. 84.*

"My personal favourite of all the games on any micro ... To the ordinary person it is an excellent view of what can be done in the field of computer games. It is a compulsive game but people who cannot take game sessions of 9 hours or so, which happened on one happy Sunday, will be grateful to know that there is a 'save to tape' option. FOOTBALL MANAGER has everything I could ... The originator, Addictive Games, certainly deserve the name" *Rating: 19/20 Practical Computing – August 1983.*

"When I first received this game I spent the best part of the weekend playing it. Since then I have returned to it more often than any other. The truly addictive quality of this game is the remarkable way it mirrors the real football manager's problems ..." *Personal Computer Games – Summer 1983.*

"Addictive Games has shown that it is possible to write excellent programs in Basic – Football Manager. I think you're going to be over the moon about this one" *Popular Computing Weekly 19.4.84*

"The different things you can do ... like putting players up for sale. It's incredible. The Highlight sequences are pure magic. And then you have to sit on the sidelines and sweat it out! Completely fantastic. I want one!" *Charlie Nicholas, Arsenal Striker, Big K April 1984.*

Prices:	
BBC Model B	£7.95
Commodore 64	£7.95
Spectrum 48K	£6.95
ZX81 16K	£5.95

(N.B. 3D GRAPHICS ARE NOT INCLUDED IN THE ZX81 VERSION)
Overseas orders add £1.50

Strategy Game of the Year, 1983
(Nominated)
Golden Joystick Awards

Addictive

£7·95

Available from computer software stockists nationwide including



and John Menzies

To order by mail (p&p free) send cheques or postal order to:

Addictive Games
7A RICHMOND HILL, BOURNEMOUTH BH2 6HE

(continued from page 113)

any Interface 1 command.

You should now be able to print to the screen in the new layout using Print #9. Apart from the problem with CHR$ etc. mentioned above, most of the normal control characters can be used. The routine operates with colour controls, Inverse, and position controllers. The number in Tab statements — and the second number in an At statement — has a range of 0-247 — 248-255 will continue on to the next line.

Text at pixel positions

This means that text can be printed at pixel positions across the screen. Positions down the screen have the normal 0-21 range. CHR$ 6 — the "Print comma" — puts the cursor at the beginning of the next print zone — either half way across the screen, or at the beginning of the next line — as normal, and CHR$ 13 will move the print position to the beginning of the next line.

When used with the printer, the buffer is copied whenever a new line is started. As you can see, there are no major differences between using this routine and using the normal Print command.

The character set is stored as it is in the ROM, except that the first byte of data for each character stores the width. The remaining 7 bytes store the bit-pattern, which starts one bit from the left of the character — see diagram 1. The top line of the character is therefore always printed as a 0 (blank).

Poke the first byte

To set 40-column printing, Poke the first byte of each character with 6 — listing 3. Then Poke the "right-hand margin" addresses — are marked on the hex listings — with 239 — this is 40*6-1. You will probably also want to redefine the character set, as the specially designed "proportional spacing" character set can look very odd when printed with regular spacing. Other column widths can be set similarly.

If you would rather waste your time on more exciting things than typing in hex, I can supply a copy of the routine on tape, including both 16K and 48K versions, together with a short demonstration program, for £3. Orders to P. Rhodes at 104 Ventnor Gardens, Luton, LU3 3SW; Giro transfers or Transcash to a/c 30 564 4602 — write on back "Please send Print Prog".

Listing 1. Hexloader

```
  1 DEF FN a(a$)=FN b(a$( TO 2))*256+FN b(a$(3 TO ))
  2 DEF FN b(b$)=FN h(b$(1))*16+FN h(b$(2))
  3 DEF FN h(h$)=CODE h$-48-7*(h$>"9")
  4 DEF FN h$(h)=CHR$ (h+48+7*(h>9))
  5 DEF FN b$(b)=FN h$(INT (b/16))+FN h$(b-16*INT (b/16))
  6 DEF FN a$(a)=FN b$(INT (a/256))+FN b$(a-256*INT (a/256))
 10 POKE 23658,8: REM CAPS LOCK on
 20 INPUT "START ADDRESS? ";a$: LET a=FN a(a$)
 30 LET d$=" ": REM SPACE marks end of string
 50 PRINT FN a$(a);" ";
 60 LET ch=0: FOR n=0 TO 7
 70 IF d$(1)=" " THEN  INPUT "Byte(s):";d$: LET c$=d$+" "
 80 IF d$( TO 3)="END" THEN  STOP
 85 IF LEN d$=2*INT (LEN d$/2) THEN  PRINT #0;"ERROR":
    BEEP .1,40: PAUSE 20: BE
EP .1,30: PAUSE 100: LET d$=" ": GO TO 70
 90 LET b=FN b(d$( TO 2)): LET d$=d$(3 TO )
100 PRINT FN b$(b);" ";: POKE a+n,b
110 LET ch=ch+b
120 NEXT n: PRINT
130 INPUT "Checksum:";c: IF ch<>c THEN  PRINT "Error in
    this line": GO TO 30
140 LET a=a+8
150 GO TO 50
```

Diagram 1.

```
0 0 0 0 0 1 0 1    =5    <1st byte
0 1 1 1 0 0 0 0    =112  <2nd byte
0 1 0 0 1 0 0 0    =72   <3rd byte
0 1 0 0 1 0 0 0    =72   <4th byte
0 1 1 1 0 0 0 0    =112  <5th byte
0 1 0 0 0 0 0 0    =64   <6th byte
0 1 0 0 0 0 0 0    =64   <7th byte
0 0 0 0 0 0 0 0    =0    <8th byte
a b b b b c c c
```

The first byte determines how many columns (from the left) will be printed.

a=one column blank for spacing between characters
b=These columns make up the character
c=These columns are ignored.

Listing 2.

```
  10 REM Put this routine in any programs
  20 REM that you write that use PrintProg
  30 REM If you have a 16K Spectrum, replace
  40 REM 63779 with 31011
9990 LET dis=63779-(PEEK 23631+256*PEEK 23632): POKE
23593,INT (dis/256): POKE 2
3592,dis-256*PEEK 23593: RETURN
```

Listing 3.

```
10 INPUT "16K or 48K?";K
20 IF K=48 THEN  LET start=64512
25 IF K=16 THEN  LET start=31744
30 FOR f=start TO start+767 STEP 8: POKE f,6: NEXT f
40 LET prog=start-768
50 POKE prog+391,239: POKE prog+662,239

16K R.H.Margin addresses are 31367 and 31638
48K R.H.Margin addresses are 64135 and 64406
```

Data for 16K print program.

7900	01	0E	00	2A	C2	5C	28	C3	=471
7908	5D	16	23	EB	D5	21	22	79	=778
7910	01	05	00	ED	B0	E1	ED	53	=972
7918	4F	5C	4F	CD	52	23	22	28	=774
7920	5C	C9	27	79	C6	15	5B	D9	=975
7928	D5	D9	CD	31	79	D9	D1	D9	=1448
7930	C9	3F	3A	AA	7A	57	3A	29	=832
7938	7A	B2	20	13	7E	FE	A5	D2	=1104
7940	AB	7A	FE	90	38	02	D6	4F	=1042
7948	FE	80	38	02	3E	23	5F	21	=665
7950	A8	7A	3A	29	7B	CB	7F	C2	=1036
7958	E3	7A	3A	38	5C	CB	4F	3A	=898
7960	AA	7A	C2	2A	7B	FE	01	28	=946
7968	33	30	1D	7D	FE	0D	CA	DA	=858
7970	7A	FE	06	20	09	7E	FE	B0	=931
7978	36	80	D2	BA	7A	C9	FE	17	=1130
7980	23	23	3E	01	32	AA	7A	C7	=675

7988	3E	16	93	87	87	87	E6	F8	=1114
7990	D6	08	36	00	23	77	3E	01	=493
7998	32	AA	7A	C9	AF	32	AA	7A	=1360
79A0	7B	BE	73	DA	BC	7A	C9	FE	=1363
79A8	16	20	06	3E	02	32	AA	7A	=466
79B0	C9	FE	A5	D2	AB	7A	D6	20	=1369
79B8	DA	DB	7A	CD	C7	79	05	06	=1305
79C0	08	C5	CD	D6	79	1B	40	26	=871
79C8	00	6F	29	29	29	11	00	7C	=375
79D0	19	5E	E5	DD	E1	C9	3A	91	=1198
79D8	5C	06	FF	1F	38	01	04	1F	=476
79E0	1F	F5	7B	0E	B0	3D	CB	29	=846
79E8	3D	20	FB	79	EE	FF	09	57	=1262
79F0	1E	FF	3A	AE	7A	E6	07	28	=910
79F8	09	37	CB	1A	CB	1B	3D	20	=615
7A00	F8	07	F1	DC	0C	00	C9	2A	=1179
7A08	A8	7A	3E	AF	94	E6	F8	5F	=1240
7A10	CB	3F	CB	3F	CB	3F	E6	18	=1057
7A18	F6	40	67	7B	E6	38	CB	27	=1064

7A20	CB	27	CB	3D	CB	3D	CB	3D	=1034
7A28	B5	6F	3E	00	18	03	DD	7E	=728
7A30	00	CD	40	7A	24	F1	3D	7D	=974
7A38	20	F4	10	39	3E	00	10	F1	=634
7A40	A9	57	1F	0C	3A	AB	7A	E6	=864
7A48	07	28	07	CE	3A	CB	1B	3D	=636
7A50	20	F9	D9	7A	D9	A6	77	7A	=1244
7A58	A0	20	04	B3	B6	36	00	AE	=734
7A60	77	23	D9	7E	D9	A6	77	7B	=1119
7A68	A0	20	04	B3	B6	36	00	AE	=735
7A70	77	28	DD	23	C9	E1	25	E5	=1078
7A78	23	CD	DB	0E	E1	CD	DB	0B	=1130
7A80	D1	21	AB	7A	7B	E6	FE	FB	=1291
7A88	77	DB	AF	77	23	7E	FE	0B	=1052
7A90	38	04	D6	0E	77	C9	3E	07	=671
7A98	77	2A	51	5C	E5	C6	02	C0	=776
7AA0	00	0C	E1	22	51	5C	C9	00	=781

(listing continued on next page)

(continued from previous page)

7AA8	00	A7	0C	B6	65	38	11	95	=928
7AB0	00	F5	CB	41	0C	38	07	3E	=652
7AB8	20	05	CB	27	79	D1	1A	EA	=1075
7AC0	7F	05	CF	27	79	D1	1A	13	=959
7AC8	87	30	F3	D1	FE	48	28	03	=1004
7AD0	FE	02	D0	73	FE	03	D8	3E	=1257
7AD8	20	CB	27	79	C9	C6	90	32	=990
7AE0	29	7B	C9	E5	07	4F	D6	04	=899
7AE8	30	1F	06	03	21	21	7B	09	=283
7AF0	46	05	28	04	7B	17	10	FD	=534
7AF8	11	04	0C	19	46	21	BF	5C	=384
7B00	AE	A0	AE	77	AF	32	29	7B	=1016
7B08	C9	3C	4F	73	FE	02	30	F4	=1011
7B10	21	91	5E	79	FE	01	7B	06	=775
7B18	01	20	E5	07	97	06	04	18	=310
7B20	DF	0A	04	03	87	37	38	80	=143
7B28	40	00	28	F1	01	7B	28	73	=640
7B30	30	6B	FE	16	20	06	3E	02	=533
7B38	32	AA	7A	C7	FE	0D	20	03	=845
7B40	AF	18	60	F1	17	20	04	3E	=570
7B48	01	18	ED	F1	06	20	07	7E	=687
7B50	E6	80	EE	00	10	4D	D6	20	=1071
7B58	DA	DD	7A	CD	C7	79	D5	CD	=1504
7B60	AD	7B	21	00	5B	3A	A8	7A	=768
7B68	CB	3F	CB	3F	CB	3F	6F	D1	=1118
7B70	D5	06	08	C5	CD	D6	79	3E	=1026
7B78	00	16	03	DD	7E	00	CD	40	=543
7B80	7A	3E	20	B5	6F	F1	3D	F5	=1007
7B88	20	F1	C1	21	A7	7A	CD	AD	=1166
7B90	7B	D1	73	C6	77	FE	FB	D8	=1425
7B98	AF	77	CB	CD	06	3E	01	32	=821
7BA0	A6	7A	C3	3E	77	D0	AF	32	=1225
7BA8	AA	7A	C5	CD	4E	ED	5B	A7	=1201
7BB0	7A	7A	53	5F	ED	53	A7	7A	=1073
7BB8	C9	00	00	00	00	00	00	00	=201

FA68	A0	20	04	B5	E6	36	00	AE	=785
FA70	77	2B	DB	23	C9	31	25	E5	=1076
FA78	23	CD	DB	09	E1	3D	DB	0B	=1130
FA80	D1	21	A8	FA	78	36	FE	FB	=1419
FA88	77	DB	AF	77	23	7E	FE	0B	=1052
FA90	38	04	D6	09	77	39	3E	07	=671
FA98	77	2A	51	5C	E5	36	02	CD	=776
FAA0	88	0C	E1	22	51	5C	C9	00	=781
FAA8	00	A7	00	B6	65	38	11	95	=928
FAB0	00	F5	CB	41	0C	38	07	3E	=652
FAB8	20	05	CB	27	F9	D1	1A	E6	=1203
FAC0	7F	05	CB	27	F9	D1	1A	13	=1087
FAC8	87	30	F3	D1	FE	40	28	03	=1004
FAD0	FE	82	D8	73	FE	03	DA	3E	=1257
FAD8	20	CB	27	F9	C9	36	90	32	=1116
FAE0	29	FB	C9	E5	07	4F	D6	04	=1027
FAE8	30	1F	06	03	21	21	FB	09	=411
FAF0	46	05	28	04	7B	17	10	FD	=534
FAF8	11	04	00	19	6A	21	BF	5C	=384
FB00	AE	A0	AE	77	AF	32	29	FB	=1144
FB08	C9	3C	4F	73	FE	02	30	F4	=1011
FB10	21	71	5C	77	FE	01	7B	06	=775
FB18	01	20	E5	07	07	36	04	18	=310
FB20	DF	0A	04	03	07	37	38	80	=143
FB28	40	00	28	F1	01	7B	28	73	=640
FB30	30	6B	FE	16	20	06	3E	02	=533
FB38	32	AA	FA	C7	FE	0D	20	03	=973
FB40	AF	18	60	F1	17	20	04	3E	=570
FB48	01	18	ED	F1	06	20	07	7E	=687
FB50	E6	80	EE	03	10	4D	D6	20	=1071
FB58	DA	DD	FA	CD	C7	F9	D5	CD	=1760
FB60	AD	FB	21	00	5B	3A	A8	FA	=1024
FB68	CB	3F	CB	3F	CB	3F	6F	D1	=1118
FB70	D5	06	08	C5	CD	D6	F9	3E	=1154
FB78	00	18	03	DD	7E	00	CD	40	=643
FB80	FA	3E	20	B5	6F	F1	3D	F5	=1135
FB88	20	F1	C1	21	A7	FA	CD	AD	=1294
FB90	F5	D1	7B	C5	77	FE	FB	D8	=1554
FB98	AF	77	C3	C3	0E	3E	01	32	=921
FBA0	AA	FA	C9	BE	77	D0	AF	32	=1367
FBA8	AA	FA	C3	CD	4E	ED	5B	A7	=1329
FBB0	FA	7A	53	5F	ED	53	A7	FA	=1207
FBB8	C9	00	00	00	00	00	00	00	=201

Data for 48K print program.

F900	01	0C	00	2A	53	5C	2B	CD	=471
F908	55	16	23	EB	D5	21	22	F9	=906
F910	01	05	09	ED	B0	E1	ED	5B	=977
F918	4F	5C	AF	ED	52	23	22	28	=774
F920	5C	C5	27	F9	C4	15	5C	D9	=1103
F928	D5	D5	CB	31	F9	D9	D1	D9	=1576
F930	C9	5F	3A	AA	FA	57	3A	29	=960
F938	FD	BE	20	13	7B	FE	A5	D2	=1232
F940	AB	F4	FF	90	38	07	D6	4F	=1176
F948	FE	8C	38	02	3E	23	5F	21	=665
F950	AB	F4	3A	29	FB	CB	7F	C2	=1292
F958	E3	F4	3A	3D	5C	CB	4F	3A	=1026
F960	AA	FA	C2	2A	FB	FE	01	28	=1202
F968	33	3C	1B	7B	FE	0D	CA	8A	=958
F970	FA	FE	06	20	09	7C	FE	80	=1059
F978	36	0C	D2	8A	FA	C9	FE	17	=1258
F980	20	25	3E	01	32	AA	FA	C9	=803
F988	3C	16	93	87	87	87	E6	F8	=1119
F990	D6	0E	36	00	23	77	3E	01	=493
F998	32	A0	FA	C9	AF	32	AA	FA	=1316
F9A0	7B	BE	73	DA	8C	FA	C9	FE	=1491
F9A8	1A	20	06	3E	02	32	AA	FA	=594
F9B0	C9	FE	A5	D2	AB	FA	D6	20	=1497
F9B8	DA	BD	FA	CD	C7	F9	D5	06	=1561
F9C0	0B	CE	CD	D6	F9	18	40	26	=999
F9C8	00	6F	29	29	29	11	00	FC	=503
F9D0	19	5E	E5	DD	E1	C9	3A	91	=1198
F9D8	5C	06	FF	1F	7E	01	04	1F	=476
F9E0	1F	FE	7B	0E	00	3D	CB	29	=846
F9E8	3D	2C	F8	79	EE	FF	D7	57	=1262
F9F0	1E	FF	3A	A8	FA	EA	07	28	=1038
F9F8	0B	37	C3	1A	CD	1B	3D	20	=615
FA00	FB	D5	F1	DB	0E	00	C9	2A	=1179
FA08	A0	FA	3E	AF	94	E6	FB	5F	=1376
FA10	CB	3F	C3	3F	CD	3F	C6	10	=1052
FA18	F6	4C	67	7B	EA	38	CB	27	=1064
FA20	CD	27	C3	3D	CB	3D	CB	3D	=1034
FA28	B5	6F	3E	00	18	03	DD	7E	=720
FA30	00	CE	40	FA	24	F1	3D	F5	=1102
FA38	20	F4	18	39	3E	00	18	F1	=684
FA40	A7	37	1C	00	3A	A0	FA	C6	=772
FA48	07	27	07	CB	3A	CB	18	3B	=606
FA50	20	F5	D7	7A	D9	A6	77	7A	=1244
FA58	80	2C	04	B2	B6	36	00	AE	=784
FA60	77	77	D7	7B	09	A6	77	7B	=1119

Data for "proportionally spaced" character set. Replace "X" with "F" or "7".

XC00	04	00	00	00	00	00	00	00	=4	XD80	05	70	48	48	70	40	40	00	=501
XC08	02	40	40	40	40	00	40	00	=322	XD88	05	30	48	48	48	50	28	00	=399
XC10	04	50	50	00	00	00	00	00	=164	XD90	05	70	48	48	70	50	48	00	=525
XC18	06	28	7C	28	28	7C	28	00	=414	XD98	05	30	48	20	10	48	30	00	=293
XC20	05	10	78	50	78	28	78	20	=533	XDA0	04	70	20	20	20	20	20	00	=276
XC28	05	48	48	10	20	48	48	00	=341	XDA8	05	48	48	48	48	48	30	00	=413
XC30	07	10	28	10	2A	44	3A	00	=247	XDB0	06	44	44	28	28	10	10	00	=254
XC38	03	20	40	00	00	00	00	00	-99	XDB8	06	44	44	44	54	54	28	00	=418
XC40	03	20	40	40	40	40	20	00	=323	XDC0	06	44	28	10	10	28	44	00	=254
XC48	03	40	20	20	20	20	40	00	=259	XDC8	06	44	28	10	10	10	10	00	=178
XC50	06	00	28	10	7C	10	28	00	=242	XDD0	05	78	08	10	20	40	78	00	=365
XC58	06	00	10	10	7C	10	10	00	=194	XDD8	03	60	40	40	40	40	60	00	=451
XC60	03	00	00	00	00	00	20	40	=99	XDE0	05	40	40	20	10	08	08	00	-197
XC68	06	00	00	00	7C	00	00	00	=130	XDE8	03	60	20	20	20	20	60	00	=323
XC70	02	00	00	00	00	00	40	00	=66	XDF0	06	00	10	38	54	10	10	00	=194
XC78	05	08	08	10	20	40	40	00	=197	XDF8	04	00	00	00	00	00	00	F0	=244
XC80	06	38	4C	54	54	64	38	00	=462	XE00	05	18	20	70	70	20	78	00	=437
XC88	04	20	60	20	20	20	70	00	=340	XE08	05	00	30	08	38	48	38	00	=245
XC90	05	30	48	08	10	20	78	00	=301	XE10	05	40	40	70	48	48	70	00	=501
XC98	05	30	48	10	08	48	30	00	=269	XE18	05	00	30	48	40	48	30	00	=309
XCA0	06	08	18	28	7C	08	08	00	-210	XE20	05	08	08	38	48	48	38	00	-277
XCA8	05	78	40	70	08	48	30	00	=429	XE28	05	00	30	48	70	40	38	00	=357
XCB0	05	08	10	30	48	48	30	00	=269	XE30	04	00	30	40	60	40	40	40	=404
XCB8	05	78	08	10	20	40	40	00	=309	XE38	05	00	38	48	48	38	08	70	=381
XCC0	05	30	48	30	48	48	30	00	=365	XE40	05	40	40	70	48	48	48	00	=461
XCC8	05	30	48	48	30	20	40	00	=341	XE48	04	20	00	60	20	20	70	00	-308
XCD0	03	00	00	20	00	00	20	00	=67	XE50	03	20	00	60	20	20	20	40	=291
XCD8	03	00	00	20	00	00	20	40	=131	XE58	05	40	40	50	60	50	48	00	=461
XCE0	04	00	10	20	40	20	10	00	=164	XE60	04	60	20	20	20	20	70	00	=340
XCE8	06	00	00	7C	00	7C	00	00	=254	XE68	06	00	68	54	54	54	54	00	=446
XCF0	04	00	40	20	10	20	40	00	=212	XE70	05	00	70	48	4E	48	48	00	=405
XCF8	05	30	48	10	20	00	20	00	=205	XE78	05	00	30	48	4E	48	30	00	=317
XD00	06	38	4C	54	4C	40	38	00	=418	XE80	05	00	70	48	4E	70	40	40	=501
XD08	05	30	48	48	78	40	40	00	-461	XE88	05	00	38	48	4E	38	08	08	-277
XD10	05	70	48	70	48	48	70	00	=557	XE90	05	00	50	68	40	40	40	00	=381
XD18	05	30	48	40	40	48	30	00	=373	XE98	05	00	30	40	3C	08	70	00	=285
XD20	05	60	50	48	48	50	60	00	=501	XEA0	04	00	40	60	40	40	30	00	=340
XD28	04	70	40	60	40	40	70	00	=516	XEA8	05	00	48	48	4E	48	38	00	=349
XD30	04	70	40	60	40	40	40	00	=468	XEB0	06	00	44	44	44	28	10	00	=266
XD38	05	30	48	40	58	48	30	00	=397	XEB8	06	00	44	44	44	54	28	00	=334
XD40	05	48	48	78	48	48	48	00	=485	XEC0	06	00	44	28	10	28	44	00	=238
XD48	04	70	20	20	20	20	70	00	=356	XEC8	05	00	48	48	4E	38	08	70	=397
XD50	04	30	10	10	10	50	20	00	=212	XED0	05	00	78	08	30	40	78	00	=365
XD58	05	48	50	60	50	48	48	00	=477	XED8	04	10	20	20	40	20	20	10	=228
XD60	04	40	40	40	40	40	70	00	=436	XEE0	04	50	50	50	50	50	50	00	=484
XD68	06	44	6C	54	44	44	44	00	=470	XEE8	04	40	20	20	10	20	20	40	=276
XD70	05	48	68	68	58	58	48	00	=533	XEF0	05	28	50	00	00	00	00	00	=125
XD78	05	30	48	48	48	48	30	00	=389	XEF8	07	18	24	5A	52	5A	DB	02	=550

Kuma



AMSTRAD

ZEN 1.0 Editor/ Assembler/Debugger

The most advanced Z-80 code generating system available featuring Assembler, Disassembler, Editor, Machine code Monitor, and Debugger. Complete with full assembly listing. A full professional product.

Home Budget. A complete extensive home accounting system which takes care of forecasts/estimates of future expenditure/income.

Gems of Stradus. An amazing graphics adventure game.



TATUNG Einstein

Wordprocessor, Communications, Databases, VAT Accounts, Expenses, Home Accounts, Arcade Games, Adventures, Entertainment, Educational, High level languages, Editor/Assemblers and much more.

Kuma — No. 1 for Tatung

Send for details.



SHARP MZ 700

Star Avenger £9.95, Cosmic Scramble £5.95, **Gunman £6.95**, Chessman £5.95, **Breakthrough £5.95**, Super Space Invaders £6.95, **Quadrex £5.95**, Pinball King £6.95, **Pelmanism £5.95**, Moonlander II £5.95, **Athlete £5.95**, Startrek Plus £6.95, **Cursed Chambers £6.95**, Speech Synthesis £14.50. **Books** The MZ700 Explained £5.95, Peeking and Pokeing the MZ700 £6.95 **... plus lots more**



EPSON PX-8

ZEN Editor/Assembler/ Disassembler

The first program to be released in our PX-8 Software Library £45.43 **Phone for further details.**

EPSON HX-20

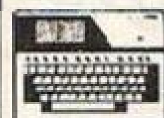
DM2 Word Processor £33.93

DM3 Spread Sheet Calculator £33.93

DMS RAM Database £33.93, Tiny Pascal Compiler £45.43

User Definable Graphics £20.13, Home Budget £19.95

plus a full range of books, Phone for details



CASIO

DM2 — Wordprocessor £29.50, Machine Code Support Pack MCS P1 £86.25

DM6 — Decision Maker £19.95, Metric to Imperial Conversion £9.95

DM17 — Pert £29.50. For further details Phone 073 57 4335

ALL PRICES INCLUDE V.A.T.

Sirius 1 apricot

Basic Tool Kit

Ten major sub routines

£97.75

commodore 64

BC BASIC **£57.50**

A complete 9K extension supplied in ROM pack

PAINTPIC **£19.95**

Drawing/Painting using a multi-colour bitmap

sinclair SPECTRUM

Frog Shooter	**£6.95**
Vegetable Crash	£6.95
Alien Destroyer	**£6.95**
Home Budget	£6.95
Logo	**£9.95**

Dealer and Distributor enquiries welcomed

PHONE NOW **(073 57) 4335** or SEND FOR DETAILS

Please tick box for information required, and send coupon to:

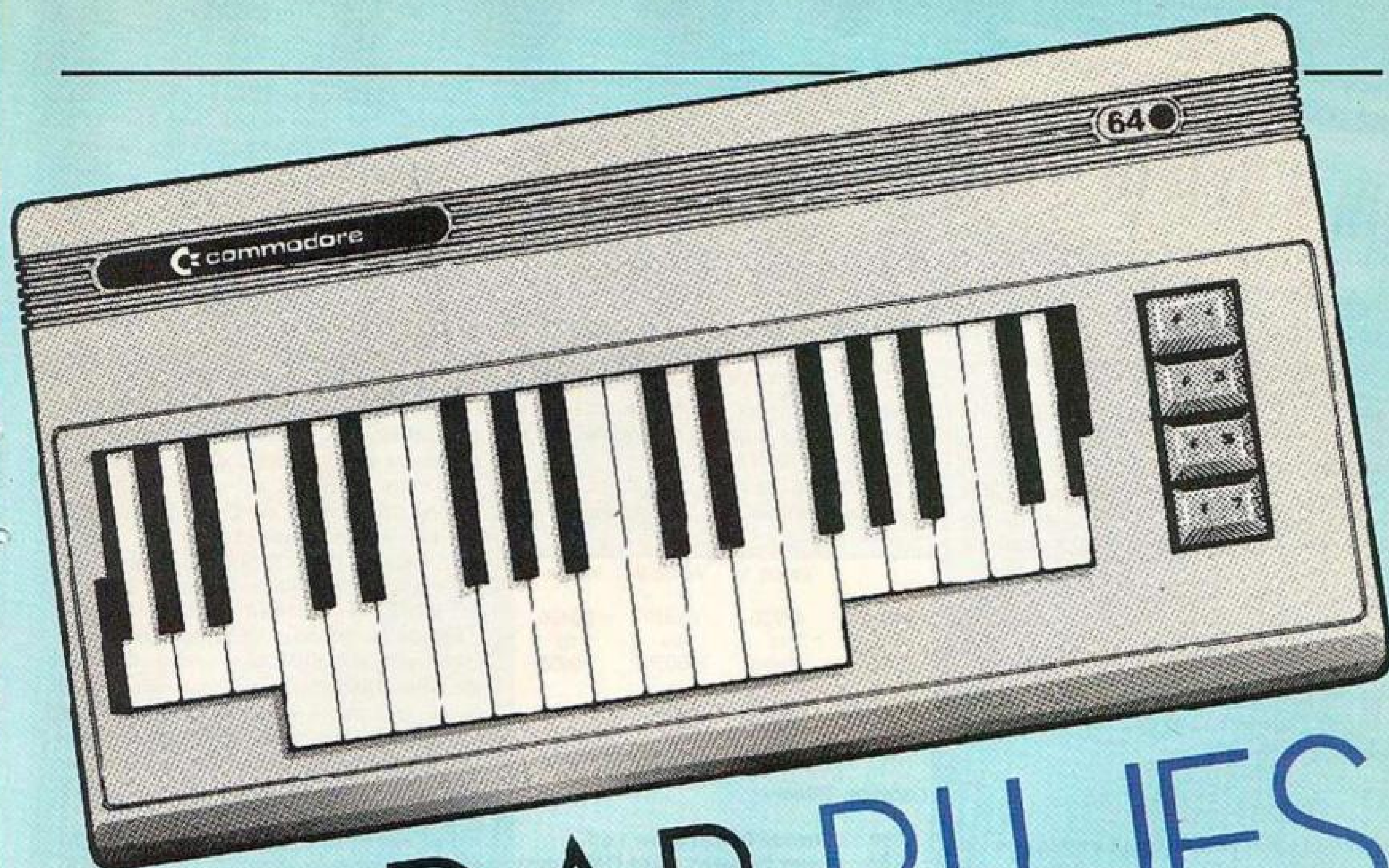
Kuma Computers Ltd.
12, Horseshoe Park,
Horseshoe Road,
Pangbourne,
Berks RG8 7JW

Hardware	Software	Hardware	Software	Hardware	Software
AMSTRAD CPC 464	☐	☐ TATUNG EINSTEIN	☐	☐ NEWBRAIN	☐
☐ SIRIUS	☐	CASIO FP 200	☐	COMMODORE 64	☐
☐ APRICOT	☐	☐ EPSON PX-8	☐	☐ ELECTRONIC MAIL	☐
☐ SHARP 700	☐	☐ EPSON HX-20	☐	☐ PRINTERS	
☐ SHARP A	☐	☐ EPSON QX-10	☐	SPECTRUM	☐
☐ SHARP PC-5000	☐				

NAME .... ADDRESS ....

.... POST CODE ....

I use a .... micro-computer



64 BAR BLUES

Woke up this morning, Paul Marzetti's interrupt blues on my mind . . .

THIS PROGRAM, FOR the Commodore 64, utilises the machine's hardware IRQ interrupt at locations 788 and 789 — hex 0314-0315 — to enable a three-voice melody to be played independently of normal program control.

A wedge of machine code is pointed to by the vector in locations 788 and 789 and is executed 60 times a second. The normal hardware interrupt is then executed.

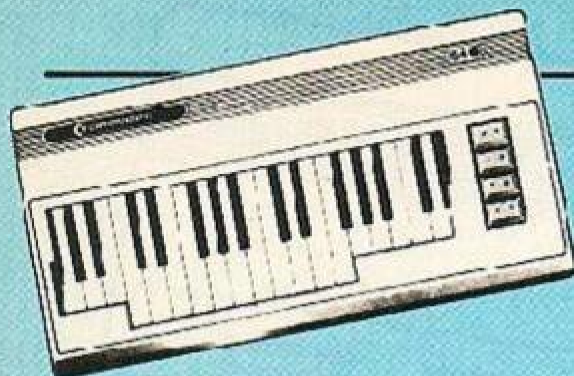
The program will allow you to use up to 255 notes. These are stored in the usual way — see 64 Programmers' Reference Guide pages 384-386 — in locations 49200 to 50955. The code is stored in locations 51000 51106. Since all of this is within the 4K RAM area 49152-53247 not usually used by Basic programs, you will be left with at least 36K of usable memory.

The suggested routine when writing your

(continued on next page)

```
5 REM  xxxxxxxxxxxxxxxxxxxxx
6 REM  x    M/CODE DATA     x
7 REM  xxxxxxxxxxxxxxxxxxxxx
10 DATA 173,238,2,240,3,76,49,234,206,23
9,2,208,248,173,240,2
20 DATA 141,239,2,174,251,0,189,48,192,2
01  55,240,70,141,1,212
30 DATA 189,92,193,141,0,212,189,136,194
,141,8,212,189,180,195,141
40 DATA 7,212,189,224,196,141,15,212,189
,12,198,141,14,212,232,234
50 DATA 142,251,0,169,0,141,4,212,141,11
,212,141,18,212,173,241
60 DATA 2,141,4,212,173,242,2,141,11,212
,173,243,2,141,18,212
70 DATA 76,49,234,169,0,141,251,0,76,69,
199
76 REM xxxxxxxxxxxxxxxxxxxxxxxxxx
77 REM x    READ M/CODE DATA    x
78 REM xxxxxxxxxxxxxxxxxxxxxxxxxx
80 FOR D=51000 TO 51106:READA:POKE D,A:N
EXT
86 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
87 REM x  READ & STORE NOTE VALUES  x
88 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
90 DIM HT(10),LT(10),HM(8),LM(8),HB(8),L
B(8)
100 FOR A=0 TO 10:READ HT(A),LT(A):NEXT
110 FOR A=0 TO 8 :READ HM(A),LM(A):NEXT
120 FOR A=0 TO 8 :READ HB(A),LB(A):NEXT
126 REM xxxxxxxxxxxxxxxxxxxxxxxxx
127 REM x    NOTE VALUE DATA    x
128 REM xxxxxxxxxxxxxxxxxxxxxxxxx
130 DATA 0,0,32,94,38,126,43,52,48,127,5
1,97,57,172,64,188,68,149,76,252,255,255
140 DATA 0,0,12,216,19,63,21,154,24,63,2
5,177,28,214,32,94,38,126
150 DATA 0,0,6,108,8,23,9,159,12,32,12,2
16,14,107,16,47,19,63
190 REM xxxxxxxxxxxxxxxxxxxxxxxxx
192 REM x    READ NOTE ORDER    x
194 REM xxxxxxxxxxxxxxxxxxxxxxxxx
200 FOR A=0 TO 103:READ B:POKE 49200+A,H
T(B):POKE 49500+A,LT(B):NEXT
210 FOR A=0 TO 103:READ B:POKE 49800+A,H
M(B):POKE 50100+A,LM(B):NEXT
220 FOR A=0 TO 103:READ B:POKE 50400+A,H
B(B):POKE 50700+A,LB(B):NEXT
```

(listing continued on next page)



(continued from previous page)

own music to be used in the program is as follows:

■ Find the note of the shortest duration in the entire melody and treat all notes as multiples of this basic value. For example, if the smallest note is a quaver — ½ beat — then it will be treated as a single note, a crotchet will be treated as a double note, a minim as four and so on.

But, remember that you are limited to using up to 255 notes, so using quavers, a tune can only consist of a maximum of 128 notes using 4/4 time.

■ Assign a note value to every note so that for every occurrence of that note the value is the same. For example:

E = 3
F# = 4
G = 5

and compile an array for each voice to contain the high and low frequencies of all notes used.

The array may look like this:

Note	Number (N)	H(N)	L(N)
rest	0	0	0
B	1	32	94
D	2	38	126
E	3	43	52
F#	4	48	127
G	5	51	97
A	6	57	172

Store your new array of note numbers in the program at lines:

130-139 Voice 1
140-149 Voice 2
150-159 Voice 3

Remember to change the parameters in lines 100-120 to take account of the number of notes used for each voice.

■ Write down the note order, taken directly from your musical score. Remember to consider whether a note is a quaver, crotchet, minim etc. and store these at lines 300-350 as data statements. Terminate this data for voice 1 with some value of N such that the high frequency of that value is 255, that is H(N) = 255.

In the program, line 300 will have the following effect:

Bq RESTq Bq RESTq Eq RESTq F#q RESTq Bc Ac Bq Aq etc . . .

which means "play the note B for one quaver, play rest for one quaver, play B for one quaver . . . .play B for one crotchet, play A for one crotchet etc. . . . . ."

■ Finally set the ADSR and waveform for each voice ADSR is set using the normal routines for sound — see User Manual pages 160-162. To set waveforms type:

POKE 753,(17 or 33 or 65) for Voice 1
POKE 754,(17 or 33 or 65) for Voice 2
POKE 755,(17 or 33 or 65) fro Voice 3

Decide on the delay between each note in increments of 1/60ths of a second and store the value at location 752. For example, a value of 15 will give a delay of ¼ of a second between successive notes. Turn on the melody using location 750 and re-route the Hardware IRQ Interrupt to location 51000 as in line 600.

This can be a very lengthy process but the results can be quite pleasing, allowing you to listen to Bach or Tchaikovsky's 1812 Overture while you type.

Many thanks to Marcus Davidson-Wright for composing the music used in the program.

	Voice 1	Voice 2	Voice 3
HI FREQ	49200 to 49455	49800 to 50055	50400 to 50655
LO FREQ	49500 to 49755	50100 to 50355	50700 to 50955

Location	Effect
750	Melody On/Off (0-on 1-off)
752	Delay between notes (1/60 secs)
753	Waveform Voice 1
754	Waveform Voice 2
755	Waveform Voice 3
788-789	Hardware IRQ Interrupt Vector

(listing continued from previous page)

```
290 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxx
292 REM *     NOTE ORDER VOICE 1     *
294 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxx
300 DATA 1,0,1,0,3,0,4,0,7,7,6,6,7,6,4,4
,1,0,1,0,3,0,4,0,7,7,6,6,7,6,9,9
301 DATA 1,0,1,0,3,0,4,0,7,7,6,6,7,6,4,2
,3,3,3,3,2,2,3,3,7,0,9,0,8,0,9,9
302 DATA 6,6,6,6,0,0,0,0,5,5,3,3,1,1,1,1
,3,3,4,4,2,2,2,2,2,2,2,2,2,2,0,0
303 DATA 0,0,0,0,0,0,10,10
305 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxx
307 REM x     NOTE ORDER VOICE 2     x
309 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxx
310 DATA 0,0,0,0,0,0,0,0,5,5,6,6,7,6,2,2
,0,0,0,0,0,0,0,0,5,5,6,6,7,6,8,8
311 DATA 0,0,0,0,0,0,0,0,5,5,6,6,7,6,2,2
,0,0,0,0,0,0,0,0,5,5,7,6,6,7,7,7
312 DATA 6,6,6,6,0,0,0,0,0,0,0,0,0,0,0,0
,3,3,4,4,2,2,2,2,1,1,1,1,1,1,0,0
313 DATA 0,0,0,0,0,0,0,0
315 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxx
317 REM x     NOTE ORDER VOICE 3     *
319 REM xxxxxxxxxxxxxxxxxxxxxxxxxxxx
320 DATA 2,2,2,2,0,0,0,0,7,7,0,0,0,0,4,4
,2,2,2,2,0,0,0,0,7,7,0,0,0,0,8,8
321 DATA 2,2,2,2,0,0,0,0,7,7,0,0,4,4,3,3
,0,0,0,0,3,3,0,0,0,0,0,0,0,0,8,8
322 DATA 6,6,6,6,0,0,0,0,5,5,0,0,2,2,2,2
,0,0,0,0,3,3,3,3,1,1,1,1,0,0,0,0
323 DATA 0,0,0,0,0,0,0,0
500 S=54272
505 :
507 REM *  SET VOLUME/CUT OFF/FILTER  *
509 :
510 POKES+24,31:POKES+22,128:POKES+23,24
4
515 :
516 REM *     ADSR VOICE 1     *
517 :
520 :     POKES+5,0 :POKES+6,240
525 :
526 REM *     ADSR VOICE 2     *
527 :
530 :   POKES+12,85:POKES+13,133
535 :
536 REM *     ADSR VOICE 3     *
537 :
540 :   POKES+19,10:POKES+20,197
545 :
546 REM *   WAVEFORM VOICE 1   *
547 :
550 :          POKE 753,17
555 :
556 REM *   WAVEFORM VOICE 2   *
557 :
560 :     POKE 754,65:POKES+10,8
565 :
566 REM *   WAVEFORM VOICE 3   *
567 :
570 :          POKE 755,33
575 :
576 REM * NOTE TIME (1/60 SECS) *
577 :
580 :          POKE 752,8
585 :
586 REM * TUNE ON/OFF (0-ON 1-OFF) *
587 :
590 :          POKE 750,0
595 :
596 REM * RE-ROUTE VECTOR TO 51000 *
597 :
600 :      POKE 788,56:POKE 789,199
```

■

CURRAH μSPEECH



Speech Synthesiser for ZX Spectrum

The **CURRAH μSPEECH** is ready to talk immediately on power up, has an infinite vocabulary and outputs speech and ZX Spectrum sound through your TV speaker. There is no software to load with **μSPEECH** — sophisticated Gate Array technology means you can just plug in and start constructing words and sentences like this:

LET S$ = "sp(ee)k (nn)(oo) (ee)vil" will say "speak no evil"! Further commands control the "voicing" of keys as they are pressed, and an intonation facility allows you to add expression to the speech.

μSPEECH is fully compatible with ZX Interface 1 and may be used with the **CURRAH μSLOT** Expandable Motherboard, allowing easy expansion of your ZX system. **μSPEECH** and **μSLOT** will also be compatible with the **CURRAH μSOURCE** unit when it arrives later this year, allowing you to write **Assembler** and **FORTH** statements directly into your **BASIC** programs!

Top selling games like ULTIMATE'S Lunar Jetman feature **μSPEECH** voice output — watch out for other titles from Bug-Byte, CDS, Ocean, Quicksilva and PSS.

μSPEECH is available from COMET, W.H. SMITH, WOOLWORTHS, GREENS, BOOTS, JOHN MENZIES, SPECTRUM STORES and good dealers nationwide — or use the form to order the **CURRAH μSPEECH** — winner of the CTA 'Product of the Year' award 1984.

CURRAH

To: MicroSpeech Offer, P.O. Box 1, Gateshead, Tyne & Wear, NE8 1AJ

Please Supply .... **MicroSpeech** unit(s) at **£29.95** each incl. VAT & P & F

.... **MicroSlot** unit(s) at **£14.95** each incl. VAT & P & F

Name (please print) ....

Address (please print) ....

.... Postcode ....

I enclose a cheque/PO payable to 'MicroSpeech Offer' value £ ....

or debit my Access/BarclayCard No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

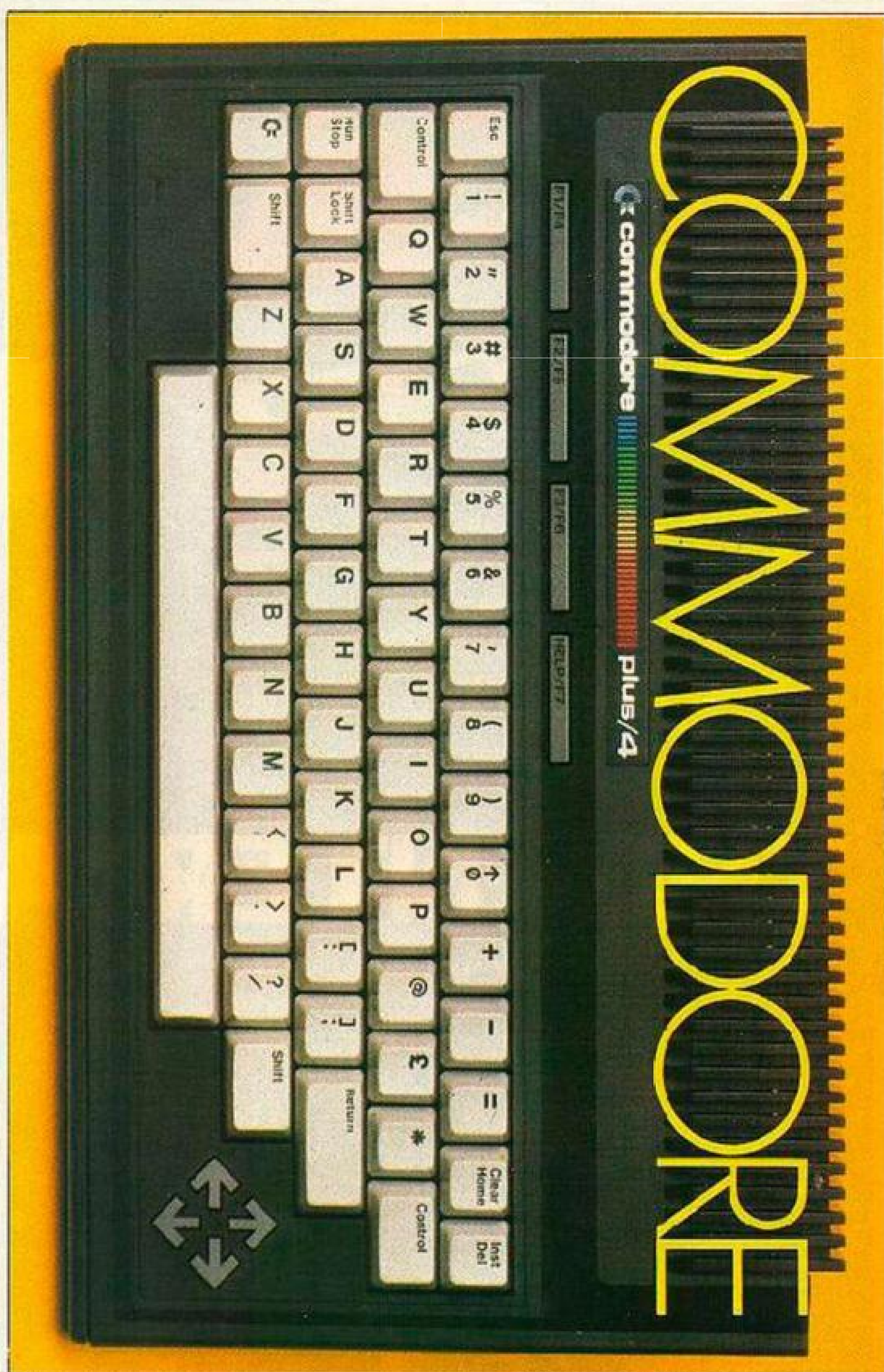
Cardholder Signature ....

Credit Card Hotline 091 - 482 4683 Please allow 28 days for delivery. Offer valid UK only.

YC?

See us at the PCW Show Stand 329

PLUS 4 *competition*



RULES

- The winner of the competition will be the person who numbers the Plus 4's features correctly and, in the view of the editor, comes up with the best idea and name for a piece of software for the Plus 4.
- The names of the winners will be printed in the November issue of Your Computer.
- All entries must arrive at the Your Computer offices by the last working day in October 1984.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employee of Business Press International or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- Business Press International assumes no responsibility or liability for any complaints arising from this competition.

WIN COMMODORE'S NEW PLUS 4

Put a 1 against your favourite feature of the Commodore Plus 4, a 2 against your second favourite and so on until you have filled all the boxes. Now think of an original idea for a program that you would like to see on the Plus 4. Invent a name for it and for the software house that you would set up to launch it. Then send this coupon to *Your Computer* Commodore Plus 4 Competition, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Name ______________________

Address ______________________

____

____

- ☐ Neat wedge styling
- ☐ 60K user RAM
- ☐ Spreadsheet
- ☐ Wordprocessor
- ☐ Database
- ☐ Graph display
- ☐ Professional keyboard
- ☐ Value for money

What you would call your software house ______________________

____

What you would call your program ______________________

____

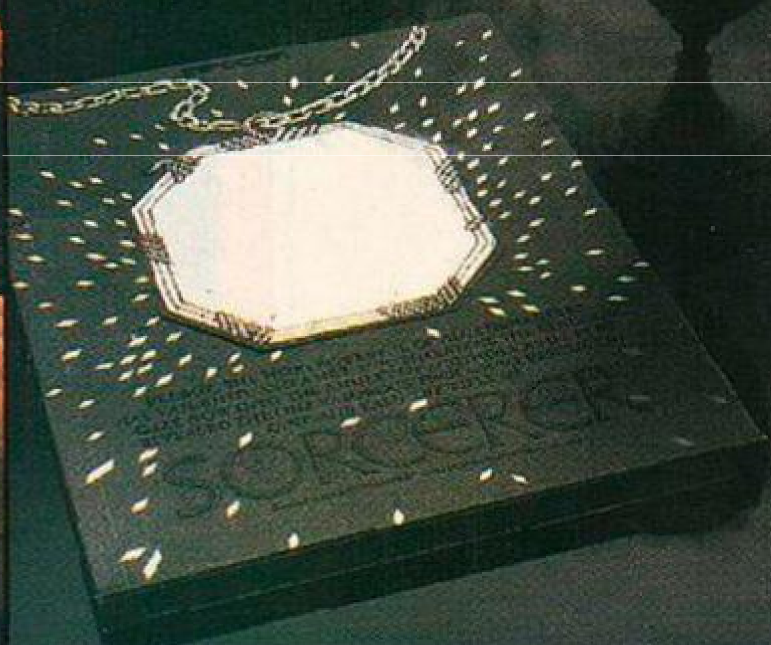
What the program would do ______________________

____



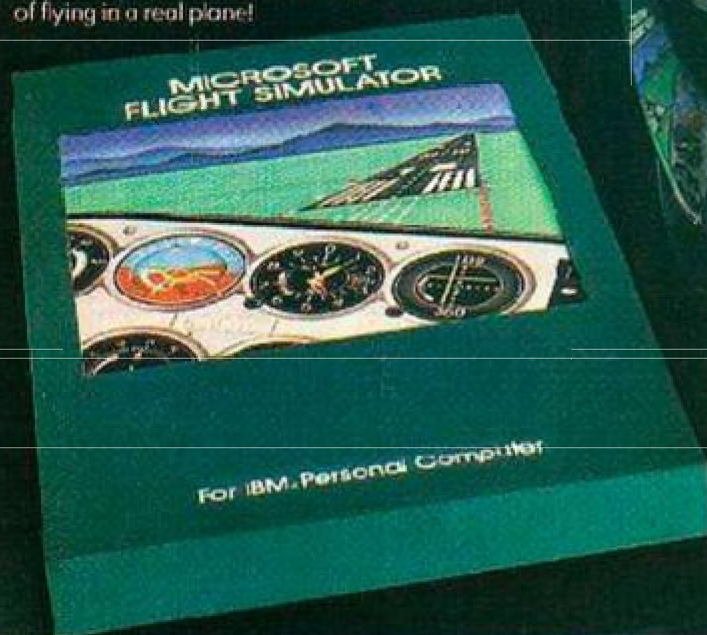
TOUCH TABLET from KOALA.
The friendly, easy way to use your computer, as a graphics tablet to write or draw on the screen, as a paddle controller or joystick, as a custom keyboard, as a way to make music, play games, create graphs, all at the Touch of a Tablet!

SORCERER from INFOCOM.
The most powerful leader of the Enchanters must be found, tracked through treacherous mists of time, avoiding the evil sorcery where terrible death awaits, and gaining the powers and cunning of a true sorcerer.



THE ENTERTAINERS

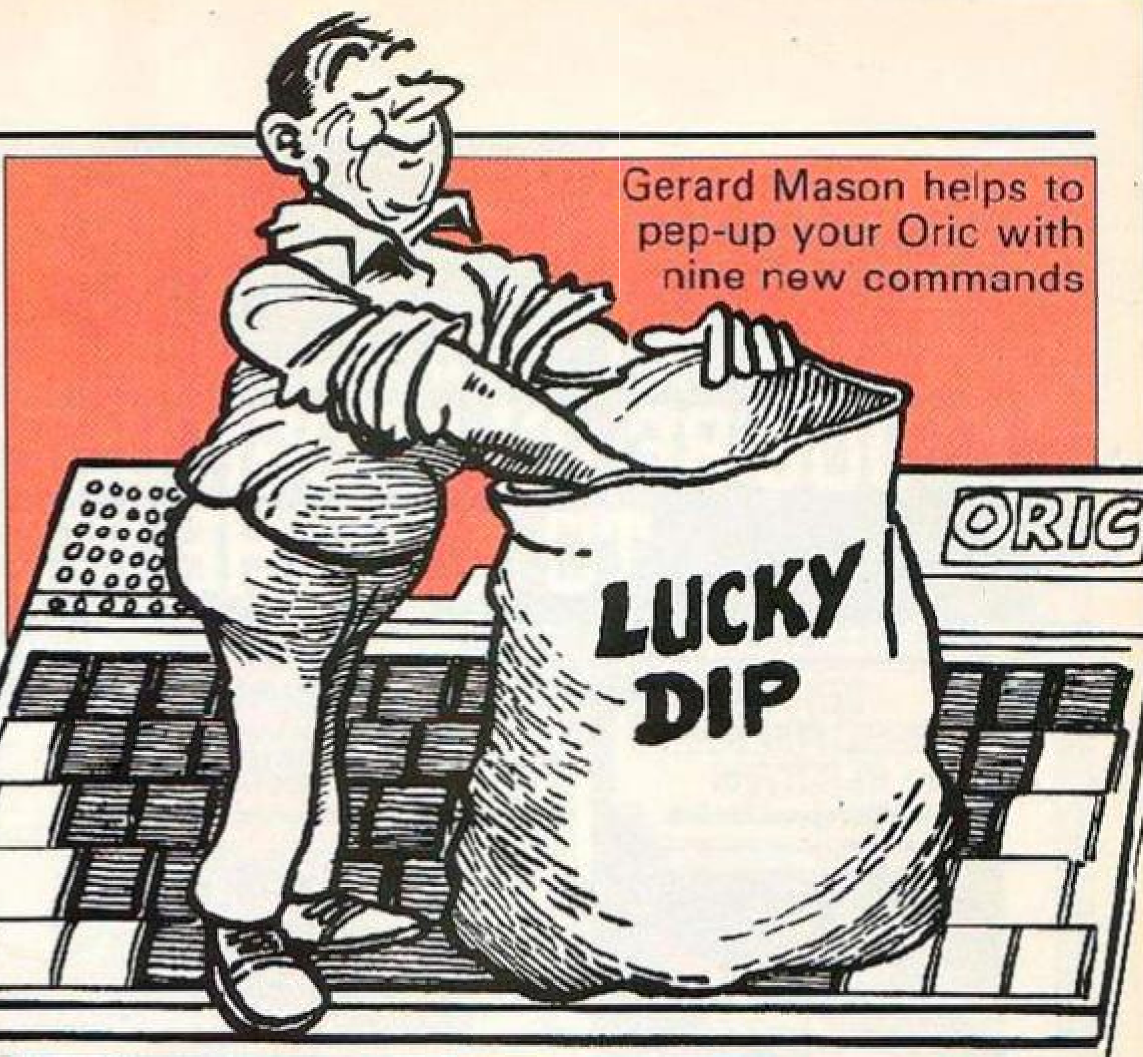
FLIGHT SIMULATOR from MICROSOFT
A highly accurate simulation of flight in a single-engine aircraft, with working instruments, panoramic out-of-the-window graphic views, and real-time flight conditions. All the excitement of flying in a real plane!





The Softsel dealer has all the software you should need: recreation, home, education and business.
When you want the best service, go to a Softsel dealer who has the best back-up in the world.

ORIC



UTILITIES

IN THIS ARTICLE I present nine new commands which together make a significant contribution to the power of Oric Basic. They include computed Restore, Sound and Draw commands, rotation of the high resolution graphics screen in all four directions, an area-fill routine, and a new CLoad which ignores auto-run and can be used from within programs.

The code, as shown in listing 2, resides at hex 9400. This can be changed by adjusting the Himem statement in line 10 and the code starting address A in line 15. Absolute jumps to within the code are computed relative to the starting address and Doked into place by lines 60 to 75, so are updated automatically. Asterisks within the listing show locations where absolute addresses will be Doked, and so must be entered.

The code date is accompanied by a disassembly and comments to help you if you decide to write your own routines. For instance you might want high resolution scrolling as well as rotations — you could adapt the code given for the rotations very easily. You can ignore the disassembly when entering the program, but you would be well advised to keep to the original line numbers for error-checking.

All the commands are accessed using !, and are space-sensitive: the exclamation mark should be followed immediately by the first letter of the command.

A computed Restore is really the only kind to have. This version is just 28 bytes long which says something about the imagination of Oric's designers. Its purpose is to restore the data-pointer to a given line, so that the next data item read will be the first one after the beginning of that line. Note that the line concerned need not actually have any data items itself. To do this I used a routine taken from Goto, whose function is to find the address of the first byte of a particular line.

The syntax of the command is,

!RESTORE expression eg., !RESTORE 300

In common with all the commands, the argument may be any expression which evaluates to a number.

Any attempt to restore to a line which does not exist will result in an error message.

(continued on page 127)

Figure 1: AY-3-8913 programmable sound generator.

REGISTER	BIT	B7	B6	B5	B4	B3	B2	B1	B0
F0	Voice A Pitch	8-Bit Fine Tune A							
R1						4-Bit Coarse Tune A			
F2	Voice B Pitch	8-Bit Fine Tune B							
R3						4-Bit Coarse Tune B			
F4	Voice C Pitch	8-Bit Fine Tune C							
R5						4-Bit Coarse Tune C			
R6	Noise Pitch				5-Bit Pitch Control				
R7	Enable	IN/OUT		Noise			Pitch		
			I/O	C	B	A	C	B	A
R8	Voice A Loudness				M	L3	L2	L1	L0
R9	Voice B Loudness				M	L3	L2	L1	L0
R10	Voice C Loudness				M	L3	L2	L1	L0
R11	Envelope Length	8-Bit Fine Tune							
R12		8-Bit Coarse Tune							
R13	Envelope Shape/Cycle					CONT	ATT	ALT	HOLD
R14	I/O Port Data Store	8-Bit Parallel I/O							

Listing 1

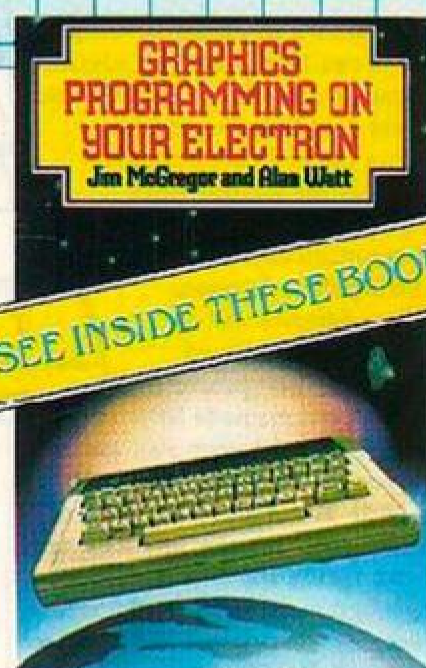
```
0 REM ut:lities d=monst-ation program
100 HIRES
110 CURSET 30,30,1
120 FOR N=1 TO 21:READ X,Y
130 !DRAW X,Y,1:NEXT
190 :
300 FOR N=1 TO 3
310 !RESTORE 800+N
320 READ X,Y:CURSET X,Y,1
330 !RESTORE 900
340 FOR J=1 TO 7:READ X,Y
350 DRAW X,Y,1:NEXT:NEXT
390 :
400 !RESTORE 950
410 FOR N=1 TO 9
420 READ X,Y,R
430 CURSET X,Y,0
440 CIRCLE R,1:NEXT
450 !U 50:!R 50:!D 50:!L 50
490 :
500 X=185:Y=75
510 PRINT "Inside or outside ?";
515 GET R$:PRINT R$
520 IF R$="O" THEN X=135
525 CURSET X,Y,0
530 !FILL
540 !U 50:!R 75:!D 50:!L 75
550 PRINT "And for my encore..."
555 PRINT "Press a key."
560 GET R$
565 CURSET X,Y,3:!FILL
570 END
590 :
700 REM main shape data
710 DATA 45,15,37,45,90,5,25,160
720 DATA 200,145,35,150,95,35,160,120
730 DATA 95,55,135,125,55,135,190,140
740 DATA 100,5,235,15,225,195,5,190
750 DATA 215,100,10,175,30,33,3,125
760 DATA 30,30
790 :
800 REM object locations
801 DATA 80,120
802 DATA 155,50
803 DATA 190,105
890 :
900 REM object data
910 DATA 20,0,10,-15
920 DATA -15,10,-5,-15
930 DATA -5,15,-15,-10
940 DATA 10,15
945 :
950 REM circle data
955 DATA 20,15,10,10,70,7,230,150,26
960 DATA 96,27,10,90,85,15,99,167,9
965 DATA 170,165,13,165,75,10
970 DATA 210,35,15
```

STOP!

IF YOU'RE AN ACORN USER, YOU NEED TO BUY THE BEST!







WRITE A WINNING PROGRAM AND WIN VALUABLE PRIZES! SEE INSIDE THESE BOOKS

Energise your Electron

- A thorough grounding in BASIC.
- Structured programming techniques.
- Packed with lots of examples.

Develop your graphic skills to the full

All you need to know to produce:

- Graphs * diagrams * pictures * 'three-dimensional' displays * plus many other designs.
- Crammed with practical and challenging exercises.
- Backed by thought-provoking examples.

MAKE THE MOST OF YOUR MICRO – PUT YOURSELF IN THE PICTURE! WITH THREE NEW BOOKS BY JIM McGREGOR AND ALAN WATT, AUTHORS WHO STAND "HEAD AND SHOULDERS ABOVE THE REST." (MICRO USER)



CORGI/ADDISON-WESLEY
TOGETHER,
THE NEW FORCE IN COMPUTER BOOK PUBLISHING



All these books are available at your bookshop, though should you find any difficulty in obtaining them, they can be ordered direct from the publisher. Simply fill in the form below.

Please send me

____ 99103 1 Better Basic for Your Electron at £4.95 (192 pages)
____ 99102 3 Graphics Programming for Your Electron at £4.95 (176 pages)
____ 99104 X Graphics Programming for Your BBC Micro at £4.95 (192 pages)

Please allow cost of book(s) plus 30p for one book plus 15p for each additional book for postage and packing.

I enclose my cheque/postal order for £________
payable to: TRANSWORLD PUBLISHERS LTD.

(IN BLOCK CAPITALS PLEASE)

Signed__________ Date__________

Name__________

Address__________

Now send to CORGI/ADDISON-WESLEY BOOKS,
61-63 Uxbridge Road, London W5 5SA

©

(continued from page 125)

The need for a command with many, many arguments became obvious after spending some time with a Beeb. But how to justify it? Oric's sound chip, the General Instrument AY-3-8912, is quite a powerful device with 14 programmable registers and an eight-bit input/output port on-chip.

While it is possible to use all its features from Basic, the commands are so structured that it is difficult to relate them to the hardware, and so see what you are doing. The new sound command simply takes its 14 arguments and drops them one by one into the registers thus giving a direct link between command and hardware.

Directly programming the registers would be difficult or impossible from Basic, since they do not correspond in any one-to-one fashion with memory addresses, and because the addresses that are used seem also to be used for scanning the keyboard.

To hear the sort of thing that can be done, turn off the keyboard click, and type in these:

!SOUND 24,0,0,0,0,0,0,62,0,0,0,15,0
!SOUND 0,0,0,0,0,0,15,7,13,16,16,0,8,0
!SOUND 0,0,0,0,0,0,31,7,13,16,16,0,24,0
!SOUND 31,0,0,0,0,0,0,62,16,0,0,31,0,0
!SOUND 47,0,0,0,0,0,0,62,16,0,0,31,0,0

Turning Ping into Pong for example, is as easy as typing

!SOUND 48,0,0,0,0,0,0,62,16,0,0,0,15,0

To make full use of the facilities offered by the new command, you will need to study figure 1, the register array.

Although Oric's relative parameters are quite useful if you want to draw a particular figure, where it is the internal relationships that are important, if you are simply designing the layout of a screen it helps to be able to use absolute screen coordinates. You can now have the best of both worlds with !Draw. Whereas Draw 10,20,1 will draw from where you are now to a point 10 places to the right and 20 further down, !Draw 10,20,1 will draw from where you are now to location 10,20 that is, somewhere at the top left of the screen.

The rotate commands always work one pixel at a time, for smoothness. However, to overcome the lack of speed which would arise if we dropped back into Basic each time we had rotated by one pixel, the commands are followed by an argument indicating how many times the rotation should take place.

The argument may go from 0 to 65535, but will always be interpreted modulo 256. Arguments from 1 to 255 will work as you expect, 0 will give a rotation of 256 times, and 257 is the same as 1.

(continued on next page)

Listing 2.

```
10 HIMEM #9400
15 A=#9400:N=0
20 REPEAT:READ R$
25 R$=LEFT$(R$,2)
30 V=VAL("#"+R$)
35 POKE A+N,V
40 N=N+1
45 UNTIL R$="&&"
50 DOKE #2F5,A
55 :
60 FOR F=1 TO 18
65 READ X,Y
70 DOKE A+X,A+Y
75 NEXT
95 END
99 :
100 REM == Get command & execute ==
101 DATA A0,00                LDY #00
102 DATA B1,E9                LDA (E9)+Y
103 DATA 08                   PHP
104 DATA E6,E9                INC  E9
105 DATA D0,02                BNE  $+2
106 DATA E6,EA                INC  EA
107 DATA 28                   PLP
108 DATA 30,03                BMI  $+3
109 DATA 4C,**,**             JMP  Rot
110 DATA C9,9A                CMP #9A
111 DATA F0,45                BEQ  Restor
112 DATA C9,A7                CMP #A7
113 DATA F0,5D                BEQ  Sound
114 DATA C9,AC                CMP #AC
115 DATA F0,69                BEQ  Draw
116 DATA C9,AF                CMP #AF
117 DATA D0,03                BNE  $+3
118 DATA 4C,**,**             JMP  Fill
119 DATA C9,B6                CMP #B6
120 DATA D0,03                BNE  $+3
121 DATA 4C,**,**             JMP  Cloud
122 DATA A2,10          Error LDX #10
123 DATA 4C,85,C4             JMP  C485
124 :
125 REM == Get Byte Values ==
126 DATA 85,03          BVals STA  03
127 DATA 86,02                STX  02
128 DATA 84,01                STY  01
129 DATA A9,00                LDA #00
130 DATA 85,00           Next STA  00
131 DATA 20,77,CE             JSR  CE77
132 DATA 20,67,D8             JSR  D867
133 DATA A5,33                LDA  33
134 DATA A4,00                LDY  00
135 DATA 91,01                STA (01)+Y
136 DATA C8                   INY
137 DATA C4,03                CPY  03
138 DATA F0,08                BEQ  Done
139 DATA 98                   TYA
140 DATA AA                   TAX
141 DATA 20,D9,CF             JSR  CFD9
142 DATA 8A                   TXA
143 DATA D0,E5                BNE  Next
144 DATA 60              Done RTS
145 :
146 REM -- ASCII to Integer --
147 DATA 20,77,CE        AtoI JSR  CE77
148 DATA 4C,67,D8             JMP  D867
149 :
150 REM == Restore to line N ==
151 DATA 20,**,**      Restor JSR  AtoI
152 DATA A5,9A                LDA  9A
153 DATA A6,9B                LDX  9B
154 DATA 20,EB,C6             JSR  C6EB
155 DATA B0,03                BCS  Found
156 DATA 4C,F1,C9       NtFnd JMP  C9F1
157 DATA A5,CE         Found LDA  CE
158 DATA E9,01                SBC #01
159 DATA 85,B0                STA  B0
160 DATA A5,CF                LDA  CF
161 DATA E9,00                SBC #00
162 DATA 85,B1                STA  B1
163 DATA 60                   RTS
164 :
165 REM == Initialise PSG ==
166 DATA A9,0E         !Sound LDA #0E
167 DATA A2,BF                LDX #BF
168 DATA A0,E0                LDY #E0
169 DATA 20,**,**             JSR  BVals
170 DATA A2,E0                LDX #E0
171 DATA A0,BF                LDY #BF
172 DATA 4C,6C,FA             JMP  FA6C
173 :
174 REM == Draw to Location ==
175 DATA A9,03          !Draw LDA #03
176 DATA A2,02                LDX #02
177 DATA A0,E3                LDY #E3
178 DATA 20,**,**             JSR  BVals
179 DATA AD,E3,02             LDA  02E3
180 DATA 38                   SEC
181 DATA ED,19,02             SBC  0219
182 DATA 8D,E1,02             STA  02E1
183 DATA A9,00                LDA #00
184 DATA E9,00                SBC #00
185 DATA 8D,E2,02             STA  02E2
186 DATA AD,E4,02             LDA  02E4
187 DATA 38                   SEC
188 DATA ED,1A,02             SBC  021A
189 DATA 8D,E3,02             STA  02E3
190 DATA A9,00                LDA #00
191 DATA 8D,E6,02             STA  02E5
192 DATA E9,00                SBC #00
193 DATA 8D,E4,02             STA  02E4
194 DATA 4C,79,F0             JMP  Draw
195 :
196 REM == Get Direction & Amount ==
197 REM == of Rotate, and Execute ==
198 DATA 48            Rotate PHA
199 DATA 20,**,**             JSR  AtoI
200 DATA 78                   SEI
201 DATA 68                   PLA
202 DATA C9,44                CMP #"D"
203 DATA F0,18                BEQ  !D
204 DATA C9,55                CMP #"U"
205 DATA F0,52                BEQ  !U
206 DATA C9,4C                CMP #"L"
207 DATA D0,03                BNE  $+3
208 DATA 4C,**,**             JMP  !L
209 DATA C9,52                CMP #"R"
210 DATA D0,03                BNE  $+3
211 DATA 4C,**,**             JMP  !R
212 DATA 58            RError CLI
213 DATA A2,10                LDX #10
214 DATA 4C,85,C4             JMP  C485
215 :
216 REM == Rotate N Pixels Down ==
217 DATA A9,BF             !D LDA #BF
218 DATA 85,01                STA  01
219 DATA 85,03                STA  03
220 DATA A9,18                LDA #18
221 DATA 85,00                STA  00
222 DATA A9,40                LDA #40
223 DATA 85,02                STA  02
224 DATA A2,C8                LDX #C8
225 DATA A0,27          Dline LDY #27
226 DATA B1,00          Dbyte LDA (00)+Y
227 DATA 91,02                STA (02)+Y
228 DATA 88                   DEY
229 DATA 10,F9                BPL  Dbyte
230 DATA A5,01                LDA  01
231 DATA 85,03                STA  03
232 DATA A5,00                LDA  00
233 DATA 85,02                STA  02
234 DATA 38                   SEC
235 DATA E9,28                SBC #28
236 DATA 85,00                STA  00
237 DATA B0,02                BCS  $+2
238 DATA C6,01                DEC  01
239 DATA CA                   DEX
240 DATA D0,E3                BNE  Dline
241 DATA A0,27                LDY #27
242 DATA B9,40,BF       Dlast LDA  BF40+Y
243 DATA 99,00,A0             STA  A000+Y
244 DATA 88                   DEY
245 DATA 10,F7                BPL  Dlast
246 DATA C6,33                DEC  33
247 DATA D0,C4                BNE  Down
248 DATA 58                   CLI
249 DATA 60                   RTS
250 :
251 REM == Rotate N Pixels Up ==
252 DATA A9,D8             !U LDA #D8
253 DATA 85,02                STA  02
254 DATA A9,9F                LDA #9F
255 DATA 85,03                STA  03
256 DATA A9,00                LDA #00
257 DATA 85,00                STA  00
258 DATA A9,A0                LDA #A0
259 DATA 85,01                STA  01
260 DATA A2,C8                LDX #C8
261 DATA A0,27          Uline LDY #27
262 DATA B1,00          Ubyte LDA (00)+Y
263 DATA 91,02                STA (02)+Y
264 DATA 88                   DEY
265 DATA 10,F9                BPL  Ubyte
266 DATA A5,01                LDA  01
267 DATA 85,03                STA  03
268 DATA A5,00                LDA  00
269 DATA 85,02                STA  02
270 DATA 18                   CLC
271 DATA 69,28                ADC #28
272 DATA 85,00                STA  00
273 DATA 90,02                BCC  $+2
274 DATA E6,01                INC  01
275 DATA CA                   DEX
276 DATA D0,E3                BNE  Uline
277 DATA A0,27                LDY #27
278 DATA B9,D8,9F       Ulast LDA  9FD8+Y
279 DATA 99,18,BF             STA  BF18+Y
280 DATA 88                   DEY
281 DATA 10,F7                BPL  Ulast
282 DATA C6,33                DEC  33
283 DATA D0,C2                BNE  Up
284 DATA 58                   CLI
285 DATA 60                   RTS
286 :
287 REM == Rotate N Pixels Left ==
288 DATA A9,00             !L LDA #00
289 DATA 85,00                STA  00
290 DATA A9,A0                LDA #A0
291 DATA 85,01                STA  01
292 DATA A2,C8                LDX #C8
293 DATA A0,00          Lline LDY #00
294 DATA B1,00                LDA (00)+Y
295 DATA A0,27                LDY #27
296 DATA 0A                   ASL  A
297 DATA 0A           Lbyte ASL  A
298 DATA 0A                   ASL  A
299 DATA B1,00                LDA (00)+Y
300 DATA 2A                   ROL  A
301 DATA 48                   PHA
302 DATA 29,7F                AND #7F
303 DATA 09,40                ORA #40
304 DATA 91,00                STA (00)+Y
305 DATA 68                   PLA
306 DATA 88                   DEY
307 DATA 10,F0                BPL  Lbyte
308 DATA A5,00                LDA  00
```

(listing continued on next page)

(continued from previous page)

Examples of the syntax of the commands are:

!U 200 (rotate up 200 times)
!D 3*N (rotate down 3*N times)
!L 30 (rotate left 30 times)
!R 2 N (rotate right 2 N times)

See the example program for more ideas.

The sharp-eyed among you will have noticed that since keywords have been borrowed for the other commands, the restriction to single letters here means that our command interpreter only has to compare one byte. This simplifies things enormously. See lines 100 to 123 in listing 2.

All the rotations are carried out with the interrupt disable flag of the 6502 set, which speeds things up by about 20 per cent. The left and right rotates are significantly slower even so. This is because Oric's use of bits six and seven for serial and parallel attributes necessitates shifting from bit 5 into and out of bit 0.

The fill command is easy to use. It starts from the current position of the graphics cursor, and takes that as being the background colour. It then fills till it reaches a border set to the opposite colour. Use it like this:

CURSET X,Y,3:!FILL

See also the example program.

Certain compromises had to be made to keep this routine to a reasonable (!) size. For example, any serial attributes within the area to be filled will make it confused: it will not hang up, but it will not fill the area in either. The other effect is better demonstrated then explained.

Try this little experiment:

```
10 HIRES:CURSET 10,0,1:DRAW 0,199,1
20 CURSET 15,0,1:DRAW 0,199,1
30 CURSET 5,50,0:!FILL
```

Fast, isn't it? Now delete line 20 and try it again! The moral is make sure that the area to be filled is either near the right-hand end of the screen *or* has another line in the boundary colour near it to the right. On average in real-life situations the command seems to be about as fast as the area-fill used in the Oric version of The Hobbit.

!CLoad ignores any auto-run. Second, it only resets the variables pointer if you have loaded a Basic program. Thirdly, if you have been loading bytes then it returns control to wherever it was called from.

If you find the prospect of typing in listing 2 rather daunting, you can get a full version plus example program on cassette by sending £2.95 to me at 39 Ashbrook Avenue, Denton, Tameside M34 2QH.

(listing continued from previous page)

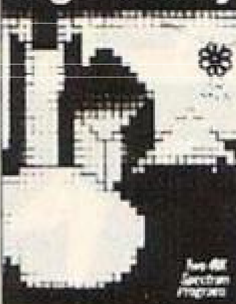
```
309 DATA 18                     CLC
310 DATA 69,28                  ADC #28
311 DATA 85,00                  STA  00
312 DATA 90,02                  BCC  $+2
313 DATA E6,01                  INC  01
314 DATA CA                     DEX
315 DATA D0,EB                  BNE  Lline
316 DATA C6,33                  DEC  33
317 DATA D0,CD                  BNE  Left
318 DATA 58                     CLI
319 DATA 60                     RTS
320 :
321 REM == Rotate N Pixels Right ==
322 DATA A9,28               !R LDA #28
323 DATA 85,00                  STA  00
324 DATA A9,9F                  LDA #9F
325 DATA 85,01                  STA  01
326 DATA A2,C8                  LDX #C8
327 DATA A0,FF           Rline LDY #FF
328 DATA B1,00                  LDA (00)+Y
329 DATA 4A                     LSR  A
330 DATA A0,D8                  LDY #D9
331 DATA B1,00           Rbyte LDA (00)+Y
332 DATA 6A                     ROR  A
333 DATA 09,40                  ORA #40
334 DATA 30,02                  BMI  $+2
335 DATA 29,DF                  AND #DF
336 DATA 29,7F                  AND #7F
337 DATA 91,00                  STA (00)+Y
338 DATA C8                     INY
339 DATA D0,F0                  BNE  Rbyte
340 DATA A5,00                  LDA  00
341 DATA 18                     CLC
342 DATA 69,28                  ADC #28
343 DATA 85,00                  STA  00
344 DATA 90,02                  BCC  $+2
345 DATA E6,01                  INC  01
346 DATA CA                     DEX
347 DATA D0,DB                  BNE  Rline
348 DATA C6,33                  DEC  33
349 DATA D0,CD                  BNE  Right
350 DATA 58                     CLI
351 DATA 60                     RTS
352 :
353 REM == Fill a Convex Shape ==
354 DATA 78               !Fill SEI
355 DATA A2,00                  LDX #00
356 DATA 8E,E2,02               STX  02E2
357 DATA 8E,E4,02               STX  02E4
358 DATA 8E,E6,02               STX  02E6
359 DATA 86,D3                  STX  P
360 DATA 86,D4                  STX  F
361 DATA CA                     DEX
362 DATA 86,08                  STX  TX
363 DATA 86,09                  STX  TY
364 DATA AE,19,02               LDX  0219
365 DATA AC,1A,02               LDY  021A
366 DATA 20,**,**               JSR  Push
367 DATA 20,**,**               JSR  Point
368 DATA 85,D0                  STA  V
369 DATA 49,FF                  EOR #FF
370 DATA 85,D1                  STA  W
371 DATA F0,02                  BEQ  $+2
372 DATA A9,01                  LDA #01
373 DATA 8D,E5,02               STA  02E5
374 :
375 DATA A6,D3             Main LDX  P
376 DATA CA                     DEX
377 DATA CA                     DEX
378 DATA BD,00,04               LDA  0400+X
379 DATA 85,08                  STA  TX
380 DATA 85,01                  STA  X
381 DATA BD,01,04               LDA  0401+X
382 DATA 85,09                  STA  TY
383 DATA 85,02                  STA  Y
384 DATA 86,D3                  STX  P
385 DATA E6,D4                  INC  F
386 DATA A5,D1                  LDA  W
387 DATA 85,D2                  STA  Z
388 DATA 20,**,**               JSR  Aplot
389 DATA C6,D4                  DEC  F
390 DATA A6,03                  LDX  X0
391 DATA 86,05                  STX  LX
392 DATA A4,02                  LDY  Y
393 DATA 84,07                  STY  YY
394 DATA A5,04                  LDA  X1
395 DATA 85,06                  STA  RX
396 DATA A9,FF                  LDA #FF
397 DATA D0,02                  BNE  $+2
398 DATA A9,01               f0 LDA #01
399 DATA 18                     CLC
400 DATA 65,07                  ADC  YY
401 DATA 85,02                  STA  Y
402 DATA A6,05                  LDX  LX
403 DATA 86,01               f1 STX  X
404 DATA A4,02                  LDY  Y
405 DATA 20,**,**               JSR  Point
406 DATA 49,FF                  EOR #FF
407 DATA 85,D2                  STA  Z
408 DATA 20,**,**               JSR  Aplot
409 DATA A5,D2                  LDA  Z
410 DATA C5,D0                  CMP  V
411 DATA D0,03                  BNE  $+3
412 DATA 20,**,**               JSR  Rplot
413 DATA A5,03                  LDA  X0
414 DATA C5,06                  CMP  RX
415 DATA F0,02                  BEQ  $+2
416 DATA B0,0D                  BCS  Next
417 DATA A6,04                  LDX  X1
418 DATA A4,02                  LDY  Y
419 DATA 20,**,**               JSR  Push
420 DATA E8                     INX
421 DATA E8                     INX
422 DATA E4,06                  CPX  RX
423 DATA 90,D4                  BCC  f1
424 DATA A5,02             Next LDA  Y
425 DATA C5,07                  CMP  YY
426 DATA 90,C5                  BCC  f0
427 DATA A5,D3                  LDA  P
428 DATA D0,92                  BNE  Fill
429 DATA 58                     CLI
430 DATA 60                     RTS
431 :
432 DATA A6,04            Rplot LDX  X1
433 DATA E8                     INX
434 DATA 86,01                  STX  X
435 DATA A5,D1                  LDA  W
436 DATA 85,D2                  STA  Z
437 DATA A4,02            Aplot LDY  Y
438 DATA 8C,E3,02               STY  02E3
439 DATA A5,01                  LDA  X
440 DATA 85,00                  STA  T
441 DATA C6,00               p0 DEC  T
442 DATA F0,0B                  BEQ  $+0B
443 DATA A6,00                  LDX  T
444 DATA A4,02                  LDY  Y
445 DATA 20,**,**               JSR  Point
446 DATA C5,D2                  CMP  Z
447 DATA D0,F1                  BNE  p0
448 DATA A6,00                  LDX  T
449 DATA E8                     INX
450 DATA 86,03                  STX  X0
451 DATA A5,01                  LDA  X
452 DATA 85,00                  STA  T
453 DATA E6,00               p1 INC  T
454 DATA A6,00                  LDX  T
455 DATA E0,F0                  CPX #F0
456 DATA F0,09                  BEQ  $+09
457 DATA A4,02                  LDY  Y
458 DATA 20,**,**               JSR  Point
459 DATA C5,D2                  CMP  Z
460 DATA D0,EF                  BNE  p1
461 DATA A6,00                  LDX  T
462 DATA CA                     DEX
463 DATA 86,04                  STX  X1
464 DATA A5,D4                  LDA  F
465 DATA F0,1A                  BEQ  e3
466 DATA A5,03                  LDA  X0
467 DATA 8D,E1,02               STA  02E1
468 DATA 20,36,F0               JSR  Crset
469 DATA A5,04                  LDA  X1
470 DATA 38                     SEC
471 DATA E5,03                  SBC  X0
472 DATA F0,08                  BEQ  e3
473 DATA 8D,E1,02               STA  02E1
474 DATA A9,00                  LDA #00
475 DATA 8D,E3,02               STA  02E3
476 DATA 20,79,F0               JSR  Draw
477 DATA 60                  e3 RTS
478 :
479 DATA E4,08             Push CPX  TX
480 DATA D0,04                  BNE  $+4
481 DATA C4,09                  CPY  TY
482 DATA F0,18                  BEQ  e4
483 DATA C0,C8                  CPY #C8
484 DATA B0,14                  BCS  e4
485 DATA 86,08                  STX  TX
486 DATA 84,09                  STY  TY
487 DATA 8A                     TXA
488 DATA A6,D3                  LDX  P
489 DATA 9D,00,04               STA  0400+X
490 DATA 98                     TYA
491 DATA 9D,01,04               STA  0401+X
492 DATA E8                     INX
493 DATA E8                     INX
494 DATA 86,D3                  STX  P
495 DATA A6,08                  LDX  TX
496 DATA 60                  e4 RTS
497 :
498 DATA 20,A6,EF   Point JSR  EFA6
499 DATA A0,00                  LDY #00
500 DATA B1,10                  LDA (10)+Y
501 DATA 2D,15,02               AND  0215
502 DATA F0,02                  BEQ  $+2
503 DATA A9,FF                  LDA #FF
504 DATA 60                     RTS
505 :
506 REM ** Load without Auto-Run **
507 DATA A5,9A           !Cload LDA  9A
508 DATA A4,9B                  LDY  9B
509 DATA 85,5F                  STA  5F
510 DATA 84,60                  STY  60
511 DATA 08                     PHP
512 DATA 20,25,E7               JSR  E725
513 DATA 20,CA,E6               JSR  E6CA
514 DATA 20,AB,F4               JSR  F4AB
515 DATA 20,04,E8               JSR  E804
516 DATA 28                     PLP
517 DATA A5,64                  LDA  64
518 DATA F0,01                  BEQ  basic
519 DATA 60               bytes RTS
520 DATA 68               basic PLA
521 DATA 68                     PLA
522 DATA A6,61                  LDX  61
523 DATA A5,62                  LDA  62
524 DATA 86,9C                  STX  9C
525 DATA 85,9D                  STA  9D
526 DATA 4C,6B,C9               JMP  C96B
8999 DATA &&
9000 REM == Jump Address Data ==
9005 DATA 15,183,34,449,41,750,91
9010 DATA 84,125,48,141,48,185,84
9015 DATA 202,343,209,396,477,702
9020 DATA 480,735,522,616,556,735
9025 DATA 563,616,572,607,587,702
9030 DATA 634,735,660,735
```

■

SPECTRUM

'O' Level Revision MATHS and FRENCH







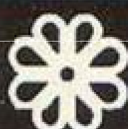


In full colour presentation boxes which include a useful leaflet of topics covered.

Programs are compatible with most 'O' level boards and randomised data is used where possible in the questions so the programs can be used many times.

Help facilities and full explanations are given where appropriate.

sae for free brochure

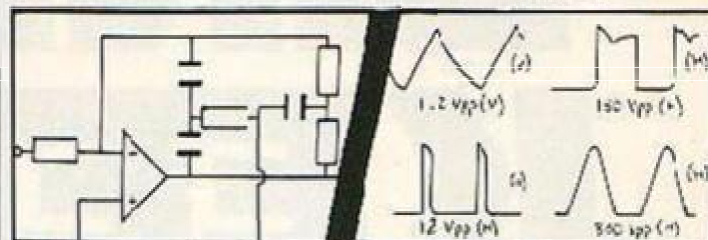


ROSE SOFTWARE
148 WIDNEY LANE
SOLIHULL
WEST MIDLANDS B91 3LH
TEL: 021-705 2895

£6.95 (inc p&p)

Spectre

ENFIELD HOUSE
SWARDESTON
NORWICH
NORFOLK



ELECTRONICS

£ 9.95

DIGITAL CIRCUIT DESIGNER. Electronics allows you to draw your circuit diagram on screen using standard symbols for logic gates, transistors, resistors, capacitors, diacs, triacs, diodes, etc, etc.. Symbols can be rotated, wiring interconnected or crossed over as required. Once complete the computer will 'power up' your circuit - high voltage levels turn red, low levels turn green. Circuits can be de-activated, modified and re-activated until they function as required, all without touching a soldering iron! Part completed circuits may be saved for future work and displays can be sent to the printer. All components are fully interactive i.e. they can change the state of sections previously activated in the sequence - even oscillators can be seen oscillating. Warning is given of short-circuits. (57 defined graphics are employed)

LiNNET



£ 14.95

LINEAR NETWORK ANALYSER. Characteristics of complete networks, including sub-circuits, are entered. The computer performs either time or frequency domain analyses, presenting the output data in any of a choice of forms, both graphical and written. The program detects the presence of a printer and, if connected, can produce detailed graphical displays by printing lengthways along the paper. Rapidly deals with highly complex networks - the instruction book provides numerous examples using transistors, I.C.s, bandpass filters, op amps, etc, etc... An invaluable tool for both professional and amateur designers.

48 K SPECTRUM

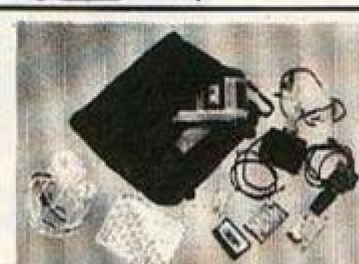
PRAYBOURNE

FREE! PROTECTIVE DUST COVER WITH EACH BAG... WORTH UP TO £4.95





CBM 64 / VIC 20 BAG
(Also takes Lynx, Acorn Electron, Atari 600XL). Price £14.95



CASSETTE/DISC DRIVE/ACCESSORY BAG

This bag will take all leads and cables, mains adaptor and plugs. It will carry all cassette and disc drive units available from most leading manufacturers. There are also 2 useful pockets to take any items such as manuals or cassettes that you are unable to squeeze into the large main bag compartment.............an ideal addition to the bags above. Price £14.95

SPECIFICATION

A strong attractive 'sports bag' type material is used inside and out. This is a nylon coated P.V.C. material which is immensely strong and waterproof. It has a wipe clean finish and all bags are available in black or royal blue.

The handles are 1" polypropylene webbing which travel all the way around the bag to give added strength. Quick release non slip nylon buckles allow access to the bag and its pockets to carry discs, manuals, plugs and leads, etc. All bags are packed with a high impact ¾" thick foam which protects computers against bangs and bumps which would normally damage the machines.

Most bags have a comfortable non-slip shoulder strap which is fully adjustable and has 'dog clip' fasteners to enable the strap to be removed if so wished. Each bag has a clear P.V.C. window on the inside to allow an address card to be inserted for identification purposes.



DRAGON BAG
(Also takes Atari 400, Atari 800XL, Texas TI 99, Tandy TRS 80 Home Computer). Price £17.50



SINCLAIR SPECTRUM BAG
(Also takes Oric, Sinclair ZX 80/81). Price £12.95



BBC MODEL B BAG
(Also takes Atari 800). Price £18.95

All these bags have been carefully designed and sculptored to fit each computer that they were designed for. Some of the bags will also take other computers and these are indicated as those inside the closed brackets.

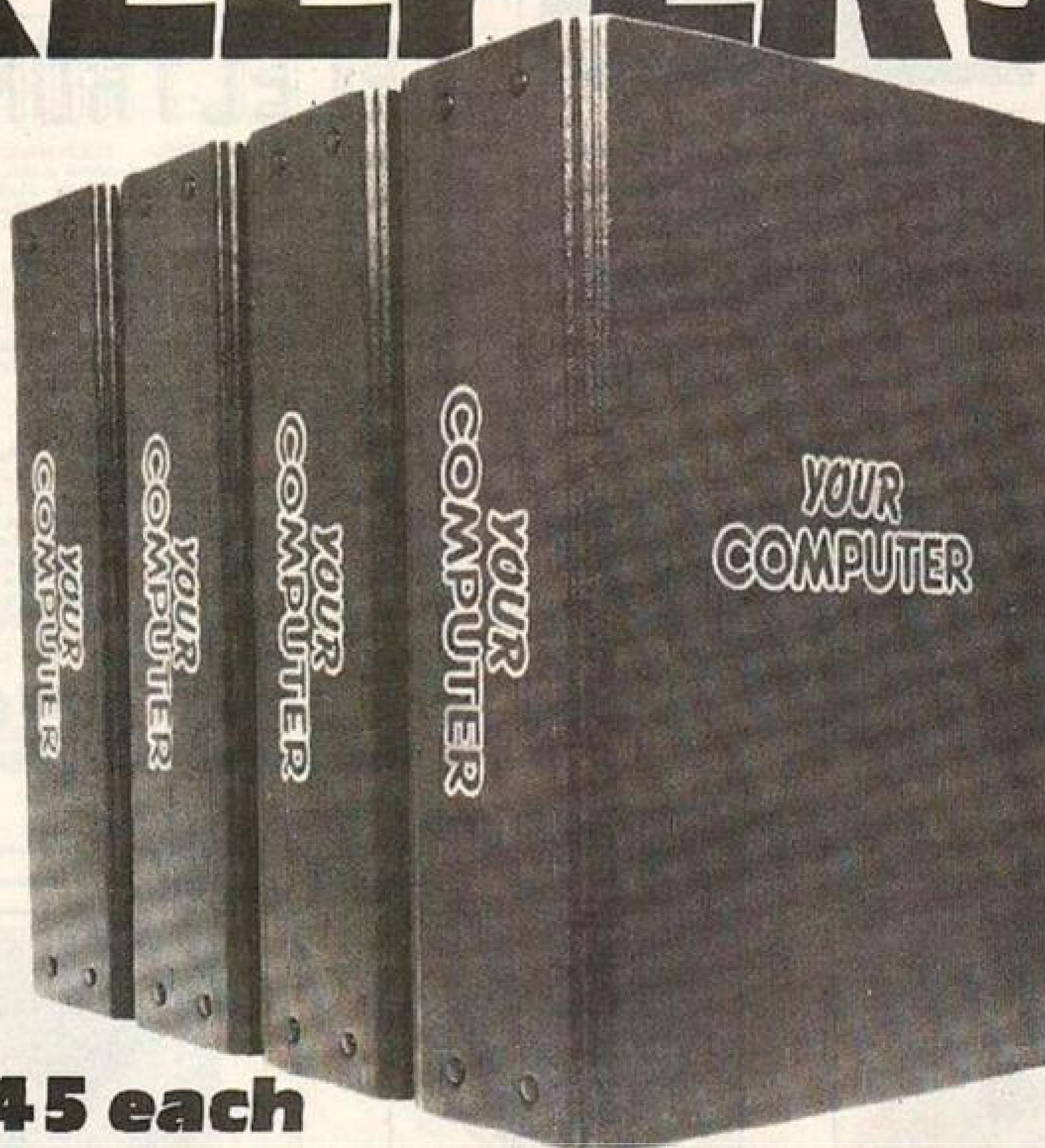
All prices are inclusive of V.A.T., postage and packing for U.K. deliveries (overseas add 20%)
PRAYBOURNE LIMITED, UNIT 5, MILLSBOROUGH HOUSE, IPSLEY STREET, REDDITCH, WORCESTERSHIRE B98 7RU
Redditch (0527) 61221, 61753

I enclose my cheque/postal order: Total............
Please send me:.................... BAG/S
together with my FREE! dust cover
NAME..
ADDRESS......................................
....
....
Please allow 14 days for delivery (overseas 28 days)

We also manufacture padded bags for most home and business computer hardware.

Trade and export enquiries welcome (large discounts available)

BINDERS KEEPERS



£3.45 each incl. post and packing

These purpose-designed binders provide the ideal home for your copies of Your Computer. Now you can pack those back copies away safely. No more worries about all that valuable information being thrown out with last week's newspapers. They are sturdily made and attractively finished in dark green with gold block title on front cover and spine. Order yours now!

Sundry Sales Dept., Room 1605, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

To: Sundry Sales Dept., Room 1605, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

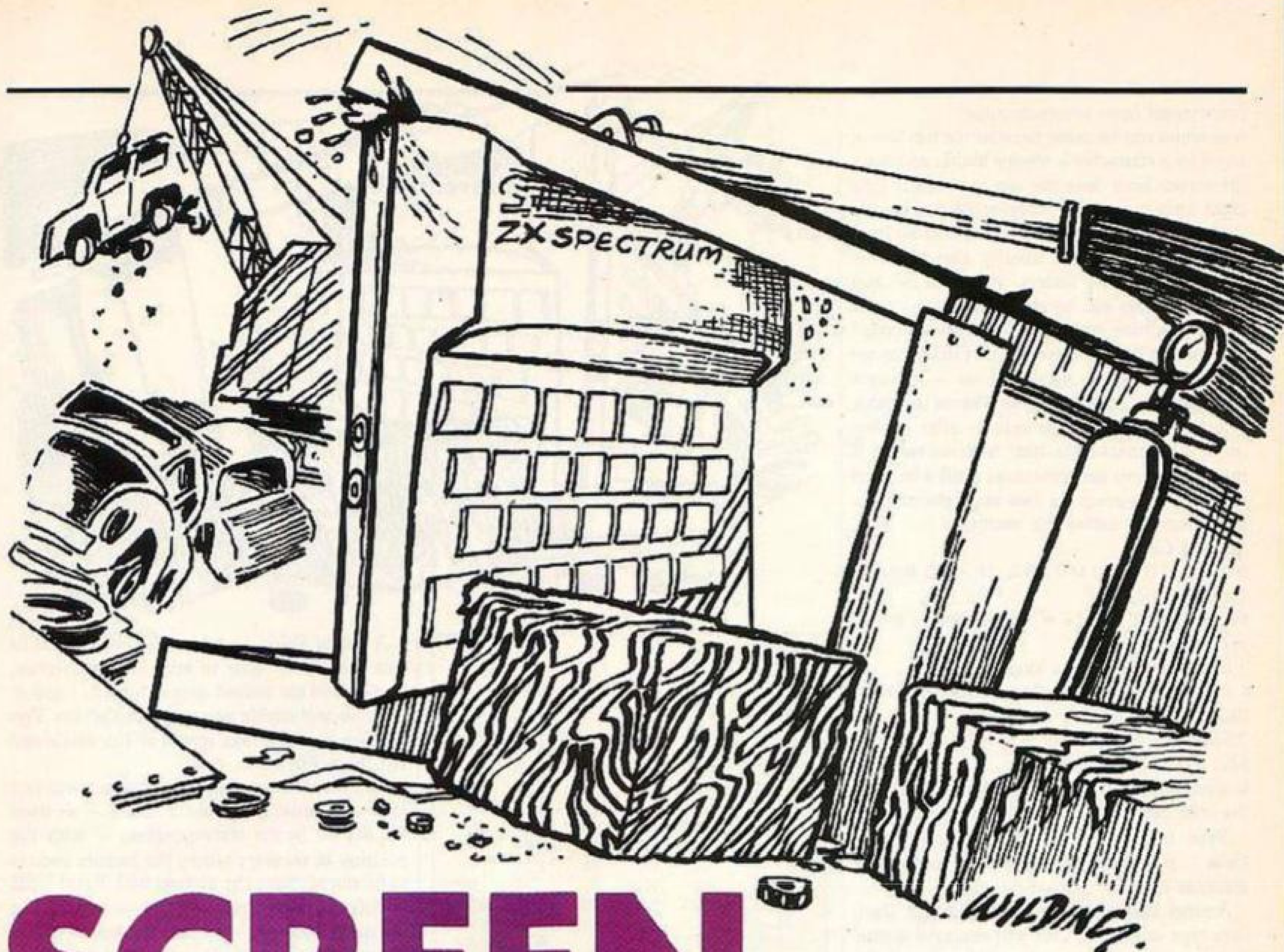
Please send me.........(state quantity) Your Computer Binder,s @ £3.45 each (£5 overseas) including post and packing.

I enclose cheque/P.O. for £.........payable to Business Press International Ltd.

NAME.........
(Please use block letters)

ADDRESS.........

Registered in England No. 151537



SCREEN COMPACTOR

R. Swailes presents a memory saving program for the Spectrum which is designed to help adventure writers to draw pictures more efficiently.

THE ORIGINAL PURPOSE of this compactor program was to enable adventure game writers to draw pictures quickly without wasting too much memory. Some adventure games draw pictures for each location but take a long time about it. This program is a compromise between slow pictures and minimum waste of memory and instant pictures but with considerable waste of memory.

Table 1.

List of locations

25021-A	25022-B
25047-A	25048-B
25148-A	25149-B

Values to be Poked

A	B		
254	71	=	Top ⅓ Screen
252	79	=	Top ⅔ Screen
0	88	=	Whole Screen
0	91	=	Whole Screen + ATT

Listing 1.

```
  5 REM   LISTING 1
  6 REM picture to code
 10 CLEAR 24999
 20 LET tot=0
 30 FOR x=25000 TO 25104
 40 INPUT "NUMBER=";no
 50 POKE x,no
 60 PRINT x;" ";no
 70 LET tot=tot-no
 80 NEXT x
 90 IF tot=12256 THEN  GO TO 150
 95 REM ERROR CHECK
100 PRINT "MISTAKE"
110 FOR x=25000 TO 25104
120 PRINT x;" ";PEEK x
130 NEXT x
140 STOP
150 PRINT "FINISHED"
160 SAVE "pi>co"CODE 25000,105
```

Listing 2.

```
  5 REM   LISTING 2
  6 REM code to picture
 30 FOR x=25130 TO 25183
 90 IF tot=5572 THEN  GO TO 150
110 FOR x=25130 TO 25183
160 SAVE "co>p."CODE 25130,84
```

The average saving of memory is about 40 per cent, though for simple line drawings it will be much higher. For very detailed pictures completely filling the screen there will be a minimal saving.

Begins at pixel one

The Spectrum screen $ save begins at pixel one and saves its value — 1=On 0=Off. The first eight pixels, for example 0,0,1,1,1,1,0,0 are represented by binary 00111100 or 60 decimal. At the first screen location in memory (16384), if Peeked, would be seen the value 60. The save continues through all locations saving the pixel values in blocks of eight. There are 49152 pixels — 49152/8 = 6144 bytes or 6K of memory.

The compactor program relies on the fact that most pictures have more background than picture. Where background = eight pixels off Bin 00000000 = decimal 0.

Even if saving a page of alpha numerics

(continued on next page)

(continued from previous page)

economies can be made because the top line of any 8 by 8 character is always blank, and since the screen scan does the top row of the first eight lines together — chapter 24 display file — these can be compressed. The bottom lines of each character are usually also blank — except lower case letters with tails — and similar savings can be made here.

The machine code save "picture to code" looks at the first screen location (16384) to see if any of the eight pixels are on — giving a value greater than zero. If so it saves the value as normal. Should it be zero — after storing the 0 — it checks the next location to see if that is also zero and continues until a lit pixel is found. The program then saves the number of consecutive zeros. For example.

Screen$ Code:

64, 2, 0 0 0 0 0 0 0 0 0 12, 19 = 13 bytes.

Compacted Data:

64, 2, <u>0, 9, 0</u>, 12, 19 = 7 bytes where 0 9 0 underlined.

0 indicates start of a loop of zeros.

9,0 Length of loop (low order byte first) 0x256 + 9 = 9 Loop = 9)

Thus 0, 0, 24 24x256 + 0 = 6144 bytes = 6K.

is a screen full of zeros in 3 bytes. To convert the code back to a picture the reverse applies.

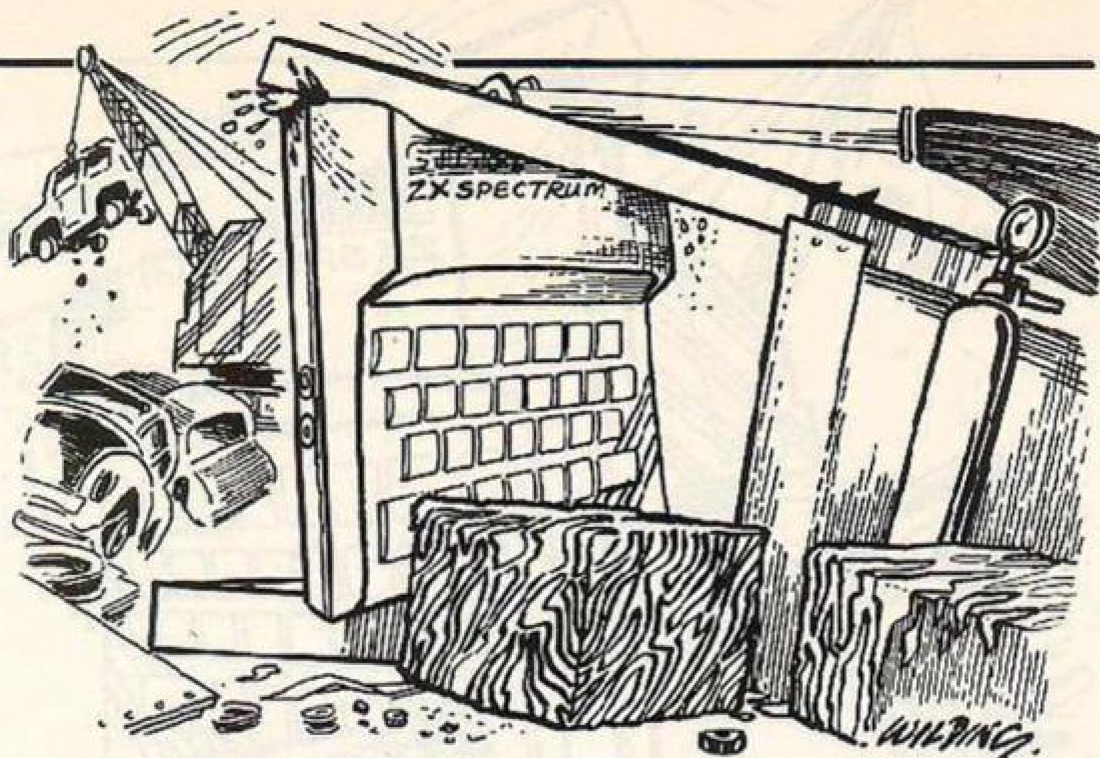
Type in listing 1 and Run, then type in Data 1. If all goes well then save to tape the machine code for picture saving.

Amend listing 1 with listing 2 and Run, then type in Data 2. This will also save to tape if it is correct. This is the machine code for picture printing.

Clear the machine

Clear the machine and type in the Demonstration Program * and Run. It will load up the Data 1 and Data 2 Code from tape. It then expects a Screen $ to load in

* If you haven't a Screen $ handy on tape then delete line 90 and insert 90 List 120. Following the program and your Screen $ — or listing — will be saved in code — in memory. The length of the code and saving can be seen. Press any key and the Screen $ instantly reappears.



Data 1.

25000	237	75	176	92	197
25005	11	33	176	92	54
25010	0	35	54	0	33
25015	255	63	35	229	3
25020	17	*0*	*88*	237	82
25025	40	67	225	126	2
25030	62	0	190	32	238
25035	237	91	176	92	19
25040	237	83	176	92	35
25045	229	17	*0*	*88*	237
25050	82	40	28	225	190
25055	40	234	3	229	197
25060	225	237	75	176	92
25065	113	35	112	229	193
25070	225	17	0	0	237
25075	83	176	92	43	24
25080	192	3	197	223	237
25085	75	176	92	113	35
25090	112	229	193	3	225
25095	11	197	225	193	237
25100	66	34	176	92	201

Data 2.

25130	42	176	92	1	0
25135	0	237	67	176	92
25140	43	17	255	63	35
25145	229	19	35	*0*	*88*
25150	237	82	40	28	62
25155	0	225	190	40	6
25160	126	235	119	235	24
25165	234	35	78	35	70
25170	235	54	0	235	11
25175	121	176	40	221	19
25180	24	244	225	201	0

A list of Pokes — table 1 — is supplied in case you don't want to save a whole screen. Just amend the started data in listings 1 and 2: and this will enable you to save either the Top ⅓, Top ⅔, the whole screen or the whole and Attribute File.

You can draw and save several pictures one after the other; just Poke 23728-9 — as lines 50, 60, 70 in the main program with the position in memory where the picture code is to be stored. Save the picture with Rand USR 25000 and then Peek 23728-9 — line 120 in the main program — to find the length of the picture code in memory and work out the next picture code start position and repeat.

For all Spectrums

To recall any picture Poke 23728-9 — lines 150,160 in the main program — where V=start position of picture code in memory then Rand USR 25130.

The program was written for all Spectrums, and the machine code is fully relocatable. For 48K machines instead of typing in numbers 25 etc. type in 35xxx or 45xxx.

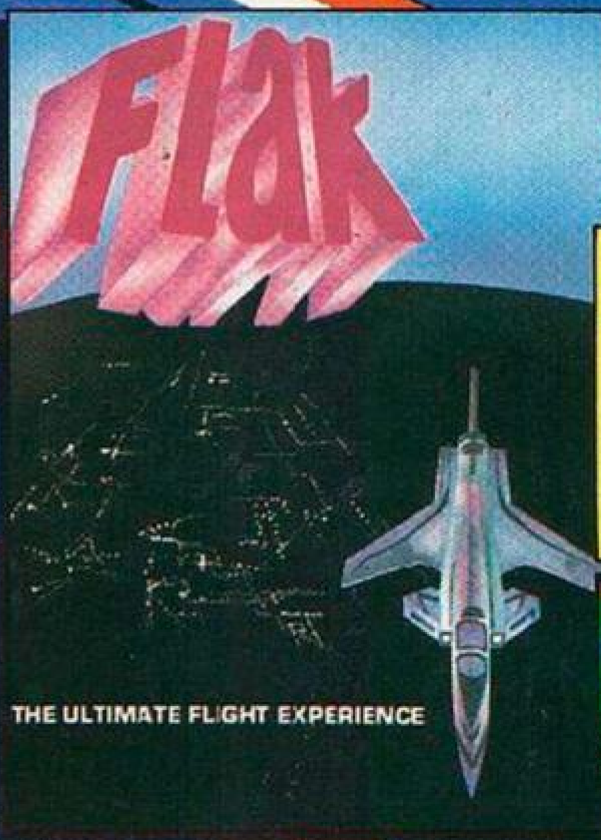
Your picture code can be saved to tape once stored in memory. See chapter 20, Spectrum manual.

Demonstration program.

```
   2 REM SCREEN COMPACTOR
   5 CLEAR 24999
   10 LOAD "" CODE 25000,105
   20 LOAD "" CODE 25130,84
   30 CLS: PRINT "WHERE IN MEMOR
Y DO YOU WANT THE PICTURE DATA S
TORED?"
   40PRINT:PRINT "(RECOMMENDED L
OCATION 25200)"
   50 INPUT v
   60 POKE 23728,v - 256*INT(v/2
56)
   70 POKE 23729,INT(v/256)
   80 CLS
   90 LOAD "" SCREEN$
   100 RANDOMIZE USR 25000
   110 CLS: PRINT "PICTURE NOW IN
MEMORY IN CODE"
   120 LET X = PEEK 23728+256*PEE
K 23729
   130 PRINT:PRINT:PRINT "PICTURE
CODE LENGTH =";X
   140 PRINT: PRINT "NORMAL SCREE
N$ LENGTH = 6144 BYTES"
   150 POKE 23728,v-256*INT(v/256
)
   160 POKE 23729,INT(v/256)
   170 PRINT:PRINT:PRINT:PRINT "H
IT ANY KEY FOR DECODED PICTURE"
   180 PAUSE 0
   190 CLS
   200 RANDOMIZE USR 25130
   210 BEEP .1,3: GO TO 210
```

Triple GOLD

A TRIO OF AMERICAN HITS





Put yourself in the Pilot's seat of an advanced AGX hypersonic fighter! You'll fly in low over awe inspiring scenery whose beauty might just be your end. Guarding the approach to the fortress is an endless array of computer controlled flak batteries. You fire, evade, fire again . . . Can you take it? Will you survive the FLAK?





DISK **£14.95**

Mystic Mansion



Explore the evil and mysterious mansions 60 rooms, and race against time to collect the 40 treasures it hides. You'll need quick thinking and an analytical mind in this unique game that blends all the excitement of arcade and adventure games in one challenge.



CASSETTE **£8.95**
DISK **£12.95**

SNOKIE



When you help Snokie rescue his girlfriend Cara the action really starts! Cara, held captive by the Grodies, needs to be rescued now! It won't be easy. Snokie will face all the natural perils of the arctic, including snow boulders glacier crevasses, moving ice blocks and falling icicles. Also there are ice lasers and cold rays installed by the Grodies. Take the challenge!





CASSETTE **£9.95**
DISK **£12.95**



Scheduled Release Date: August





THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD

U.S. Gold is stocked by all leading computer stores including:

BOOTS WHSMITH JOHNMENZIES WILDINGS

DEALERS! For information on how to become a U.S. Gold Stockist write to: CentreSoft Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH Telephone: 021-520 7591. Telex: 337268.
Overseas enquiries welcome.

U.S. GOLD
All American Software

John Nash helps to put your data in an easily readable form on the Dragon.

GRAPHS AND STATISTICS

THIS PROGRAM WILL take input data and perform simple statistical functions, including plotting graphs, upon the data. A disc drive and printer can be used but are not essential. The options provided are:

0. Input single or double variable data, and store if required. Data can also be read from disc or tape if required.

1. Mean, variance and standard deviation on each variable seperately. The formula used is for small samples, i.e., dividing the root-mean-square by (N-1) to obtain the variance. If two variables are in use, the program goes on to calculate the covariance, correlation coefficient, gradient and intercept of the best fitted line.

2. Draw a scatterplot of the data, plotting a single point at the X and Y value of each. Scaling and origin are under user control, so the graph may be expanded to fill the high resolution screen if desired. If (1) has been executed, the program will also draw the best line fore the points, calculated by (1) above.

3. Histogram of single-variable data values. The data is placed into bins of width set by the user, and then the origin and scale are set as in (2) above. The program then draws the histogram box outlines.

4. Line serial data graph. The data points are plotted and joined together, with scale and origin set by user. This is really suitable only for data in which X values are input in correct order of size, as otherwise line crossing may occur. Suitable for sets of data where X is increased under user control, while Y is read, or for sets of pre-sorted data (sort not included in this program).

5. Chi square values for significance testing. Both 2 × 2 contingency table and two column multi-row Chi square are supported.

Printer options: Every section of the program allows the printout of relevant values, including the data. If you have a printer dump for the high resolution screen, you can also draw any of the three graphs using the printer. Note that, with no printer connected, the Dragon will sulk if you execute

(continued on page 139)

HATS OFF TO MEL



☐ Please send me your free catalogue.

Please send me:

COMMODORE 64 BOOKS

- ☐ Commodore 64 Games Book 2 .... £6.95
- ☐ Commodore 64 Machine Language for the Absolute Beginner .. £6.95
- ☐ Commodore 64 Games Book £5.95
- ☐ Commodore 64 Exposed £6.95
- ☐ Commodore 64 Sound & Graphics £5.95
- ☐ Commodore 64 Software Projects £6.95

SPECTRUM BOOKS

- ☐ Complete Spectrum BASIC Course £9.95
- ☐ Over The Spectrum £4.95
- ☐ Spectrum Machine Language for the Absolute Beginner £5.95
- ☐ Understanding Your Spectrum £6.95
- ☐ The Complete Spectrum ROM Disassembly £9.95
- ☐ Super Charge Your Spectrum £5.95
- ☐ Spectrum Microdrive Book £5.95
- ☐ Advanced Spectrum Machine Language £6.95
- ☐ Spectrum Micronet Book £6.95

GENERAL BOOKS

- ☐ Learning With Adventure Programs £5.95
- ☐ A Guide to Playing The Hobbit £3.95
- ☐ C&V.G Book of Adventure £5.95

BBC BOOKS

- ☐ BBC Software Projects £6.95
- ☐ BBC BASIC for Beginners £7.95
- ☐ BBC Hardware Projects £8.95

I enclose my cheque/money order for £

Please debit my Access Card No. Expiry Date

Signature

Name

Address

Postcode YC OC

Orders to:
Melbourne House Publishers
39 Milton Trading Estate
Abingdon, Oxon OX14 4TD

Correspondence to:
Church Yard
Tring
Hertfordshire HP23 5LU

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Trade enquiries welcome.

£

£ +p/p .80

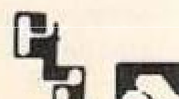
Total

£

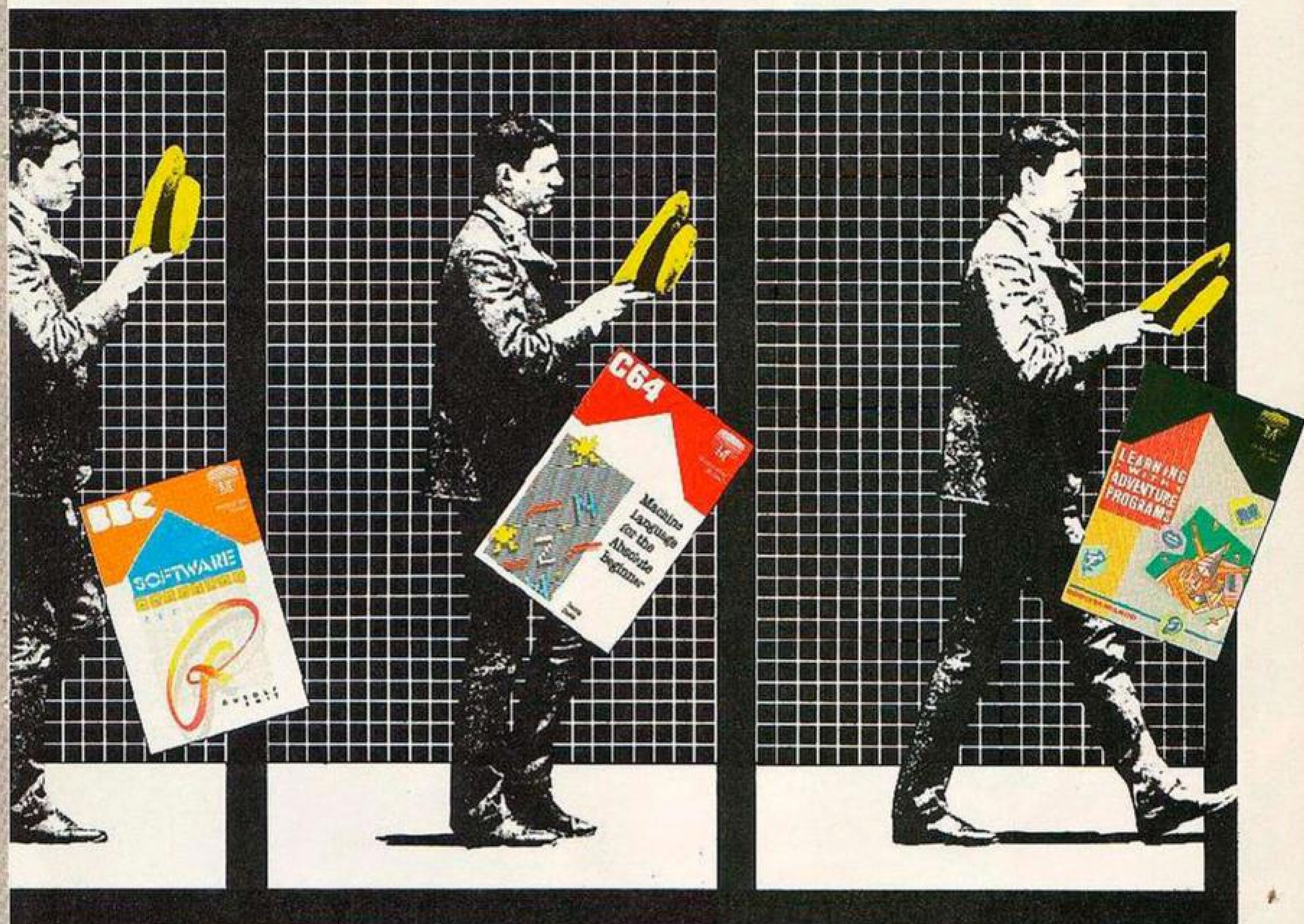
All prices include VAT where applicable. Please add 80p for post and pack.

Access orders can be telephoned through on our 24-hour ansafone (0235) 83 5306.





BOURNE HOUSE!



The Complete Spectrum BASIC Course is a comprehensive book which will immediately become an indispensible learning tool for all your Spectrum programming. All is revealed in our easy, step-by-step guide with programs and "test yourself" exercises. The appendices explains the major pitfalls that you may encounter in each problem. Even if the idea of writing programs is completely mystifying to you this book will show you just how easy it is and how much fun you can have learning. In no time you will be able to write and enjoy complex programs. If you want to learn to program your Spectrum then The Complete Spectrum BASIC Course is the book for you.

Commodore 64 Games Book 2. Just when you thought it was safe to go back to your micro . . . here's 30 more exciting, original games for your Commodore 64. Every game is new! And every game has been specifically designed with easy to understand sub-structures so you learn programming skills as you go. There's arcade games, strategy games and games you can modify and develop yourself. With CHEXSUM, typing in is easier, and mistakes are quickly located. A must for all Commodore owners.

BBC Software Projects is a special book which will enable you to create useful programs and learn more about programming.
Software Projects gives you program ideas, discusses the overall set-up and an outline of the various procedures. You write the programs, and Software Projects tells you how to test it or offers hints and clues on how to do it. Create six useful programs, ranging from information management, business programs and games.

Commodore 64 Machine Language for the Absolute Beginner. Everything the first time Commodore user needs to know about Commodore 64 Machine Language. Each chapter includes specific examples of machine language applications that can be used on your Commodore 64. Easy to understand, this book is essential for every Commodore 64 owner wishing to go beyond BASIC.

Learning With Adventure Programs gives you a chance to enjoy the most exciting and challenging type of computer game together with friends or children. The book outlines how to make Adventure playing a sharing experience and specific examples are given for The Hobbit, Valhalla, The Quill and Snowball.

Hex dump for fine print.

```
7400 1E 0 0 0 B6 1B BD 80 F 86 40 BD 80 F 86 1B
7410 BD 80 F 86 41 BD 80 F 86 8 BD 80 F CC 1D E0
7420 FD 74 0 17 0 B3 BE 74 0 C6 C0 A6 84 84 F0 B7
7430 74 2 7F 74 3 84 80 10 26 0 B8 B6 74 2 84 40
7440 10 26 0 BA B6 74 2 84 20 10 26 0 BC B6 74 2
7450 84 10 10 26 0 BE B6 74 3 BD 80 F 4F BD 80 F
7460 30 88 E0 5A 26 C5 86 D BD 80 F 8D 6C BE 74 0
7470 C5 C0 A6 84 84 F B7 74 2 7F 74 3 84 8 10 26
7480 0 9C B6 74 2 84 4 10 26 0 9F B6 74 2 84 2
7490 10 26 0 A1 B6 74 2 84 1 10 26 0 A3 B6 74 3
74A0 DD C0 F 4F BD 80 F 30 88 E0 5A 26 C5 86 D BD
74B0 80 F FC 74 0 C3 0 1 FD 74 0 10 83 1E 0 10
74C0 25 FF 60 B6 A BD 80 F 3D 80 F 8D 80 F 86 1B
74D0 BD 80 F 86 40 BD 80 F 39 86 1B BD 80 F 86 2A
74E0 BD 80 F 86 4 BD 80 F 86 80 BD 80 F 86 1 BD
74F0 80 F 39 B6 74 3 8B 80 B7 74 3 16 FF 3D B6 74
7500 3 8B 20 B7 74 3 16 FF 3B B6 74 3 8B E B7 74
7510 3 16 FF 39 B6 74 3 8B 2 B7 74 3 16 FF 37 B6
7520 74 3 8B 80 B7 74 3 16 FF 59 B6 74 3 8B 20 B7
7530 74 3 16 FF 56 B6 74 3 8B 8 B7 74 3 16 FF 54
7540 B6 74 3 8B 2 B7 74 3 16 FF 52 8B 3 B7 74 3
7550 16 FF 4E 0 FF FF FF FF 0 0 0 0 FF FF FF FF
7560 0 0 0 0 FF FF FF FF 0 0 0 0 FF FF FF FF
TO USE 'FINE-K' VERSION (WIDER PRINT WITH ESC K).
MAKE THESE CHANGES
POKE &H74DF,&H4B
FOR N=&H74E3 TO &H74E7:POKE N,&H12:NEXT N
```

(continued from page 135)

a

PRINT # −2

instruction, as it will wait for a signal from the printer. So don't try to print the data unless you have a printer connected. You can regain control with the Reset button.

The program as listed is for Delta disc system use — Premier/Cumana — but only uses this for data storage and retrieval, and printer dump loading. If you do not want to use a disc then change lines as indicated in the listing for tape.

Similarly with the printer high resolution dump; if you do not have one, omit line 10 and lines 10700 — end. If you are not using my listings for the Epson RX80, the program will stop and announce that they are not loaded when you try to print a graph. At this stage, you can load your own dump and Execute it, with no effect on the graph sitting securely on the high resolution screen.

These statistical functions are standard, and their use is fully explained in any of the standard books on statistics. I suggest reference to one of these unless you are quite sure what the tests mean. The program will only work with positive values, so if you have any negative data, add a suitable constant before entering it. Remove the constant from your results.

Finally, the program could easily have further modules added for specialised statistical tests if your application requires it. Place them at 10800 onward, and call them from the menu routine starting at 3000.

The two programs listed here will dump the high resolution screens of the Dragon 32 or 64 onto the Epson RX 80 printer. They are written in Assembler, which reduces the running time to about 15 to 30 seconds per dump — Basic takes 15 to 20 minutes!

■ Large will draw the picture rotated through 90 deg, so that horizontal lines now go down the paper. This allows a larger picture.

■ Small draws a picture on the paper exactly corresponding to the screen — 1 dot per pixel.

Both use the And function to test bits set but the method of accumulating the bytes naturally varies — see listings for more detail. The Epson printer uses an 8-bit "word" to instruct a *vertical* row of eight dots in graphic mode. The programs use Esc @ to reset the printer, and Esc A to set line spacing. Esc K can also be used to give a different size — see below. Esc " 4 is used to set up CRT graphic mode.

To load the programs, first put in the hex, bytes as data statements from line 100 onwards. Then use the following hex loader:

10 CLEAR200,&H73FF
20 FOR N = START TO FINISH
30 READ A$:POKEN,VAL("&H" + A$)
40 NEXT N

Then immediately save it on tape/disc with

CSAVEM"HEXDUMP",START,FINISH, ENTRY

Start has the value &H7400 for both programs, while Finish is &H7548 for Large and &h74C0 for Small. Entry is &H7404 for Large, and &H710C for Small.

To use the programs

CLEAR200,&H73FF

and load the code — before or after running your drawing program; it doesn't matter. Get your printer onto a new sheet, and Exec from the Entry point given above. The program cannot be interrupted while running, but returns to Basic aftwards. You will find that

PMODE4:SCREEN1,1

gives the best results.

Small prints at 80 dots per horizontal inch as listed. To get a wider drawing, use Esc K — 60 dots per inch:

POKE&H743B,&H43
FOR N = &H743F TO &H7443:POKEN,&H12:
NEXT

(continued on next page)

```
1 REM STATISTICS
10 CLEAR200,&H73FF:GOSUB10700
15 CLS:PRINT"NAME OF FILE TO BE USED",,"(MUST HAVE AL
READY BEEN CREATED)":PRINT:INPUT F$
20 GOTO1000
30 GOTO3000
1000 CLS:PRINT@171,"STATISTICS"
1010 PRINT@236,"(C) J.F.G.NASH 1984"
1020 PRINT@448,"NEW DATA OF ";F$;" (N/S)"
1030 A$=INKEY$:IFA$<>"N" AND A$<>"S" THEN1030
1040 IFA$="S" THEN2000
1050 PRINT@448,"HOW MANY VARIABLES? (1/2)"
1060 A$=INKEY$:IFA$<>"1" AND A$<>"2" THEN1060
1070 VN=VAL(A$)
1080 PRINT@448,"HOW MANY OBSERVATIONS";:INPUTNU:IFNU<2
THEN1080
1090 DIMA(VN,NU)
1100 CLS:FORN=1 TO NU
1110 INPUT"X";A(1,N)
1120 IFVN=2 THENINPUT"Y";A(2,N)
1130 NEXT
1135 GOSUB9700
1140 CLS:PRINT"STORE IT? (Y/N)"
1150 A$=INKEY$:IFA$=""THEN1150
1160 IFA$<>"Y"THEN30
1170 OPEN#1,F$
1180 PRINT#1,VN:PRINT#1,NU
1190 FORN=1 TO NU
1200 PRINT#1,A(1,N)
1210 IFVN=2 THENPRINT#1,A(2,N)
1220 NEXT
1230 CLOSE:GOTO30
2000 OPEN#1,F$
2010 INPUT#1,VN,NU
2020 DIMA(VN,NU)
2030 FORN=1 TO NU
2040 INPUT#1,A(1,N)
2050 IFVN=2 THENINPUT#1,A(2,N)
2060 NEXT
2070 CLOSE:GOTO30
3000 CLS:PRINT"1.  MEAN, S.D, VARIANCE":PRINT
3020 PRINT"2.  SCATTERPLOT":PRINT
3030 PRINT"3.  HISTOGRAM":PRINT
3040 PRINT"4.  LINE GRAPH":PRINT
3050 PRINT"5.  CHI SQUARE":PRINT
3070 PRINT@480,"WHICH? (1-5)"
3080 INPUTW:IFW<1 OR W>5 THEN3080
3090 ON W GOSUB 4000,5000,6000,7000,8000
3100 GOTO3000
4000 REM MEAN, S.D., VARIANCE
4010 CLS:SX=0:SQ=0:SY=0:SR=0:SS=0
4015 PRINT"(THINKING...)"
4020 FORN=1 TO NU
4030 SX=SX+A(1,N)
4040 SQ=SQ+(A(1,N)^2)
4050 IFVN=2 THENSY=SY+A(2,N):SR=SR+(A(2,N)^2):SS=SS+(A
(1,N)*A(2,N))
4060 NEXT
4090 CLS:PRINT"MEAN X = ";:MX=SX/NU:PRINTUSING"####.##";MX
4100 IFVN=2 THENPRINT"MEAN Y = ";:MY=SY/NU:PRINTUSING"####.##";MY
4110 PRINT:PRINT"VARIANCE X = ";:VX=(SQ-(SX^2)/NU)/(NU-1):PRINTUSING"####.##";VX
4120 IF VN=2 THENPRINT"VARIANCE Y = ";:VY=(SR-(SY^2)/NU)/(NU-1):PRINTUSING"####.##";VY
4130 PRINT:PRINT"S.D. X = ";:DX=SQR(VX):PRINTUSING"###
#.##";DX
4140 IF VN=2 THENPRINT"S.D. Y = ";:DY=SQR(VY):PRINTUS
ING"####.##";DY
4145 PRINT@448,"PRESS SPACE BAR TO CONTINUE"
4146 A$=INKEY$:IFA$<>" " THEN4146
4147 CLS
4150 IFVN=2 THENPRINT:PRINT"COVARIANCE = ";:CO=(SS-(SX
*SY/NU))/(NU-1):PRINTUSING"####.##";CO:PRINT"CORREL CO
EFFICIENT = ";:CC=CO/(SQR(VX*VY))
4155 IFVN=2 THENPRINTUSING"####.##";CC:PRINT"GRADIENT
= ";:GR=CO/VX:PRINTUSING"####.##";GR:PRINT"Y-INTERCEPT
 = ";:IX=MY-(GR*MX):PRINTUSING"####.##";IX
4156 GF=1
4160 IFVN=2 THENPRINT:PRINT"STUDENT'S T TEST ";(NU-2);
"D.F.","VALUE = ";:TT=CC*(SQR(NU-2))/(SQR(1-(CC^2))):T
T=ABS(TT):PRINTUSING"####.##";TT
4500 PRINT@448,"PRESS SPACE BAR TO CONTINUE"
4510 A$=INKEY$:IFA$<>" "THEN4510
4520 CLS:PRINT"PRINTOUT? (Y/N)"
4530 A$=INKEY$:IFA$=""THEN4530
4540 IFA$<>"Y"THENRETURN
4550 POKE&H99,30:REM COMMA FIELD
4560 PRINT"GET PRINTER READY-      ","THEN PRESS <N>"
4570 A$=INKEY$:IFA$<>"N" THEN4570
4580 PRINT#-2,"STATISTICS RESULTS":PRINT#-2
4590 PRINT#-2,"NUMBER OF OBSERVATIONS","  ";NU:PRINT#-
2
4600 PRINT#-2,"MEAN X:",:PRINT#-2,USING"####.##";MX
4610 IFVN=2 THENPRINT#-2,"MEAN Y:",:PRINT#-2,USING"###
#.##";MY
4620 PRINT#-2:PRINT#-2,"VARIANCE X:",:PRINT#-2,USING"#
###.##";VX
4630 IFVN=2 THENPRINT#-2,"VARIANCE Y:",:PRINT#-2,USING
"####.##";VY
4640 PRINT#-2:PRINT#-2,"S.D  X:",:PRINT#-2,USING"####.
##";DX
4650 IFVN=2 THENPRINT#-2,"S.D.  Y:",:PRINT#-2,USING"##
##.##";DY
4660 PRINT#-2
4670 IFVN=2 THENPRINT#-2,"COVARIANCE:",:PRINT#-2,USING
"####.##";CO:PRINT#-2,"CORRELATION COEFFICIENT:",:PRIN
T#-2,USING"####.##";CC:PRINT#-2,"LINE GRADIENT:",:PRIN
T#-2,USING"####.##";GR:PRINT#-2,"Y-INTERCEPT:",:PRINT#
-2,USING"####.##";IX:PRINT#-2
4680 IFVN=2 THENPRINT#-2,"STUDENT'S T TEST ";(NU-2);"D
.F.:",:PRINT#-2,USING"####.##";TT:PRINT#-2
4690 CLS:PRINT"DO YOU WANT THE DATA PRINTED (Y)"
4700 A$=INKEY$:IFA$=""THEN4700
4710 IFA$<>"Y"THENRETURN
4720 PRINT#-2:PRINT#-2,"DATA":PRINT#-2:PRINT#-2,"X:
",:"Y:":PRINT#-2
4725 POKE&H99,10:REM NARROW COLUMN
4730 FORN=1 TO NU
4740 IFVN=2 THENPRINT#-2,A(1,N),:IFVN=2 THENPRINT#-2,A
(2,N)
4745 IFVN=1 THENPRINT#-2,A(1,N)
4750 NEXT
4760 RETURN
5000 REM SCATTER PLOT
5005 IFVN=1 THENPRINT"WHAT? WITH ONE VARIABLE!":FO
RD=1 TO 2500:NEXT:RETURN
5010 CLS:PRINT"(THINKING...)":GOSUB9100:GOSUB9200
5015 GOSUB9300
5020 PMODE4:PCLS:SCREEN1,1
5030 FORN=1 TO NU
5040 XP=(A(1,N)-OX)*FX:YP=190-(A(2,N)-OY)*FY
5050 PSET(XP,YP)
5051 IFXP>=1 THENPSET(XP-1,YP)
5052 IFXP<=254 THENPSET(XP+1,YP)
5053 IFYP<=189 THENPSET(XP,YP+1)
5054 IFYP>=1 THENPSET(XP,YP-1)
5060 NEXT
5065 IFOX=0 AND OY=0 THENIFIX>=0 THENBX=0:BY=190-(IX*F
Y):ELSEBY=190:BX=ABS(IX/GR)*FX:GOTO5070
5066 KJ=IX+GR*OX:IFKJ>=OY THENBX=0:BY=190-(KJ-OY)*FY E
LSEBY=190:BX=(ABS(KJ-OY)/GR)*FX
5070 RX=(LX-OX)*FX:RY=190-((LX*GR-OY+IX)*FY)
5071 IFRY<0 ORBY<0 THENSCREEN0,0:PRINT"Y-SCALE TOO LAR
GE, PLEASE ALTER":FORD=1 TO 2500:NEXT:GOTO5015
5072 IFRY>190 THENRX=RX+(((RY-190)/FY)/GR)*FX:RY=190
5080 IFGF=1 THENLINE(BX,BY)-(RX,RY),PSET
5090 GOSUB9400
5100 A$=INKEY$:IFA$=""THEN5100
5110 CLS:PRINT"(Q) TO QUIT",,"(D) TO DISPLAY",,"(R) TO
 RE-SCALE",,"(P) TO PRINT"
5120 A$=INKEY$:IFA$=""THEN5120
5130 IFA$="Q"THENRETURN
5140 IFA$="D"THENPMODE4:SCREEN1,1:GOTO5100
5150 IFA$="R"THEN5000
5160 IFA$="P"THENGOSUB10300
5170 GOTO5110
6000 REM HISTOGRAM
6005 CLS:IFVN=2 THENPRINT"WHAT? WITH TWO VARIABLES!":F
ORD=1 TO 2500:NEXT:RETURN
6006 PRINT"(THINKING...)"
6010 GOSUB9100:GOSUB9200
6020 INPUT"DESIRED BIN WIDTH";BW
6025 IFBW<=0 THEN6020
6030 BN=INT(LX/BW)+1:IFFD=0 THENDIMB(BN):FD=1:REM NUMB
ER OF BINS
6035 PRINT"(THINKING...)"
6040 FORN=1 TO NU
6050 TE=A(1,N)/BW:TE=INT(TE)+1
6060 B(TE)=B(TE)+1
6070 NEXTN
6080 CLS:FORN=1 TO BN
6090 IFB(N)>0 THENPRINT"BIN ";N,"CONTAINS ";B(N):FORD=
1 TO 300:NEXT
6100 NEXTN
6110 PRINT"DO YOU WANT A PRINTOUT","OF BIN CONTENTS (Y
/N)"
6111 A$=INKEY$:IFA$=""THEN6111
6112 IFA$="Y" THENPRINT#-2:PRINT#-2,"BIN CONTENTS":PRI
NT#-2:ELSE6130
6113 POKE&H99,10
6114 FORN=1 TO BN
6115 IFB(N)>0 THENPRINT#-2,N;",  ",B(N)
6116 NEXT:PRINT#-2
6120 GOSUB10100:REM HISTOGRAM STATS
6130 GOSUB9200
6140 GOSUB9300
6150 PMODE4:PCLS:SCREEN1,1
6160 GOSUB9400
6165 BP=OX/BW+1
6170 FORN=INT(BP) TO BN
6180 X1=(N-1)*BW-OX)*FX+1:IFX1<0 THEN X1=0
6190 X2=X1+BW*FX
6200 Y1=190-(B(N)-OY)*FY:Y2=Y1
6220 LINE(X1,Y1)-(X2,Y2),PSET
```

(listing continued on next page)

(continued from previous page)
and resave under a different name.

Large prints four dots per pixel, thus giving double size in each direction. This can be reduced to one dot, but maintaining the separation, which gives a large fine grain picture with one dot in four printed. I call this Fine, and Fine can be obtained from Large by changing the following addresses:
&H745C,&H745D,&H745E,&H74A2,&H74A3,
&H74A4 all to &H12 (NOP code).
&H74F5,&H7521 to &H80.
&H7500,&H752C to &H20.
&H750E,&H7537 to 8.
&H7516,&H7542 to 2.

The Esc K graphics will also work with either Large or Fine, and can be added by:

```
POKE&H74DD,&H4B
FOR N = &H74E1 TO &H74E5:POKEN,
&H12:NEXT
```

You will then end up with six programs giving different scales.

One final refinement is Spacing, which is the distance between rows. This is located at &H7421 in Small, and &H7419 in Large. Normally this address contains 8, which gives no separation between adjacent lines, and no overlap. However, the dot wires in the Epson are 1/72 inch apart, so the vertical spacing is fixed at that value.

The horizontal spacing can be set at 1/60 inch — Esc K, 1/80 inch — Esc * 4, and 1/90 inch — Esc * 6, but not 1/72 inch! So your circles may not be exactly round, and spacing allows you to alter this by having small overlaps or gaps between lines. Try values of 7-10 (decimal).

Some printer cables do not have pin 14 connected, and may therefore not give auto line feed. If your whole picture appears on one line, try setting DIP switch bank 2 number 3 to On — see Epson manual.

Large print hex dump.

```
7400 13 0 0 0 85 1B BD 80 F 86 40 BD 80 F 86 1B
7410 BD 80 F 86 41 BD 80 F 86 8 BD 80 F CC 1D E0
7420 FD 74 0 17 0 B1 BE 74 0 C6 C0 A6 84 84 F0 B7
7430 74 2 7F 74 3 84 80 10 26 0 B6 B6 74 2 84 40
7440 10 26 0 B8 B6 74 2 84 20 10 26 0 BA B6 74 2
7450 84 10 10 26 0 BC B6 74 3 BD 80 F BD 80 F 30
7460 88 E0 5A 25 C6 86 D BD 80 F 8D 6B BE 74 0 C6
7470 C0 A6 84 84 F B7 74 2 7F 74 3 84 8 10 26 0
7480 9C B6 74 2 84 4 10 26 0 9E B6 74 2 84 2 10
7490 26 0 A0 B6 74 2 84 1 10 26 0 A2 B6 74 3 BD
74A0 80 F BD 80 F 30 88 E0 5A 26 C6 86 D BD 80 F
74B0 FC 74 0 C3 0 1 FD 74 0 10 83 1E 0 10 25 FF
74C0 62 86 A BD 80 F BD 80 F BD 80 F 86 1B BD 80
74D0 F 86 40 BD 80 F 39 86 1B BD 80 F 86 2A BD 80
74E0 F 86 4 BD 80 F 86 80 BD 80 F 86 1 BD 80 F
74F0 39 B6 74 3 8B C0 B7 74 3 16 FF 3F B6 74 3 8B
7500 30 B7 74 3 16 FF 3D B6 74 3 8B C B7 74 3 16
7510 FF 3B B6 74 3 8B 3 B7 74 3 16 FF 39 B6 74 3
7520 8B C0 B7 74 3 16 FF 59 B6 74 3 8B 30 B7 74 3
7530 16 FF 57 B6 74 3 8B C B7 74 3 16 FF 55 B6 74
7540 3 8B 3 B7 74 3 16 FF 53 0 0 0 0 0 0 0
```

Small print hex dump.

```
$7400   5 4 C 0 8 0 D 1 84 80 40 0 86 1B BD 80
$7410   F 86 40 BD 80 F 86 1B BD 80 F 86 41 BD 80 F
$7420   86 7 BD 80 F 8E 74 0 86 80 A7 80 44 26 FB CC
$7430   6 0 FD 74 8 86 1B BD 80 F 86 2A BD 80 F 86
$7440   4 BD 80 F 86 0 BD 80 F 86 1 BD 80 F 5F 10
$7450   8E 0 8 86 80 B7 74 B BE 74 8 CE 74 0 7F 74
$7460   A A6 85 B4 74 B 27 8 A6 C4 BB 74 A B7 74 A
$7470   30 88 20 33 41 11 83 74 8 25 E6 34 60 86 74 A
$7480   BD 80 F 35 60 74 74 B 31 3F 26 CC 5C C1 20 25
$7490   B3 34 60 86 D BD 80 F 35 60 FC 74 8 C3 1 0
$74A0   FD 74 8 10 83 1E 0 10 25 FF 8A 86 A BD 80 F
$74B0   BD 80 F BD 80 F 86 1B BD 80 F 86 40 BD 80 F
$74C0   39 80 0 0 8 0 C 0 0 0 40 0 0 0 0 0
```

(listing continued from previous page)

```
6230 LINE(X1,Y1)-(X1,190),PSET
6240 LINE(X2,Y1)-(X2,190),PSET
6250 NEXT
6300 A$=INKEY$:IFA$=""THEN6300
6310 CLS:PRINT"(Q) TO QUIT",,"(R) TO RE-SCALE",,"(D) T
O DISPLAY",,"(P) TO PRINT"
6320 A$=INKEY$:IFA$=""THEN6320
6330 IFA$="D" THENPMODE4:SCREEN1,1:GOTO6320
6340 IFA$="Q" THENRETURN
6350 IFA$="R" THEN6140
6360 IFA$="P" THENGOSUB10500
6370 GOTO6310
7000 REM LINE GRAPH FROM DATA
7010 CLS:IFVN=1 THENPRINT"WHAT? WITH ONE VARIABLE!":FO
RD=1 TO 2500:NEXT:RETURN
7015 PRINT"(THINKING....)"
7020 GOSUB9100:GOSUB9200:GOSUB9300
7025 X1=(A(1,1)-OX)*FX:Y1=190-(A(2,1)-OY)*FY)
7030 PMODE4:PCLS:SCREEN1,1
7040 GOSUB9400
7050 FORN=1 TO NU
7060 XP=(A(1,N)-OX)*FX:YP=190-((A(2,N)-OY)*FY)
7070 LINE(X1,Y1)-(XP,YP),PSET
7080 X1=XP:Y1=YP
7090 NEXTN
7100 A$=INKEY$:IFA$=""THEN7100
7110 CLS:PRINT"(Q) TO QUIT",,"(D) TO DISPLAY",,"(R) TO
 RE-SCALE",,"(P) TO PRINT"
7120 A$=INKEY$:IFA$=""THEN7120
7130 IFA$="Q"THENRETURN
7140 IFA$="D" THENPMODE4:SCREEN1,1:GOTO7100
7150 IFA$="P"THENGOSUB10500
7160 IFA$="R"THEN7000
7170 GOTO7110
8000 REM CHI SQUARE
8005 IFVN=1 THENCLS:PRINT"WHAT? WITH ONE VARIABLE!":FO
RD=1 TO 2500:NEXT:RETURN
8010 CLS:C2=0
8015 PRINT"IS THIS A 2 x 2","CONTINGENCY TABLE? (Y/N)"
8016 A$=INKEY$:IFA$=""THEN8016
8017 IFA$="Y"THEN9800ELSECLS
8020 FORN=1 TO NU
8030 C2=C2+((A(1,N)-A(2,N))^2)/A(2,N))
8035 NEXTN
8040 PRINT"CHI SQUARE GOODNESS-OF-FIT TEST",,"(";NU-2;"
 D. F.) VALUE = ";:PRINTUSING"####.##";C2
8050 PRINT@448,"PRINTOUT (Y/N)"
8060 A$=INKEY$:IFA$=""THEN8060
8070 IFA$<>"Y"THENRETURN
8080 PRINT#-2
8090 PRINT#-2,"CHI SQUARE GOODNESS OF FIT TEST":PRINT#
-2,"(";NU-2;") DEGREES OF FREEDOM"
8100 PRINT#-2,"VALUE = ";:PRINT#-2,USING"####.##";C2
8120 RETURN
9000 REM SUBROUTINES IN COMMON
9100 REM LARGEST X,Y
9110 LX=A(1,1):IFVN=2 THENLY=A(2,1)
9120 FORN=2 TO NU
9130 IFA(1,N)>LX THEN LX=A(1,N)
9135 IFVN=1 THEN9150
9140 IF A(2,N)>LY THEN LY=A(2,N)
9150 NEXT
9160 RETURN
9200 REM SMALLEST X,Y
9210 PX=A(1,1):IFVN=2 THENPY=A(2,1)
9220 FORN=1 TO NU
9230 IFPX>A(1,N) THENPX=A(1,N)
9235 IFVN=1 THEN9250
9240 IF PY>A(2,N) THENPY=A(2,N)
9250 NEXT
9260 RETURN
9300 REM CHOOSE SCALE
9310 CLS:PRINT"HOW TO CHOOSE THE SCALE"
9320 PRINT:PRINT"YOUR LARGEST X IS ";LX:IFVN=2 THENPRI
NT"YOUR LARGEST Y IS ";LY
9330 PRINT:PRINT"YOUR SMALLEST X IS ";PX:IFVN=2 THENPR
INT"YOUR SMALLEST Y IS ";PY
9340 PRINT:PRINT"ENTER DESIRED ORIGIN"," (0,0 OR ?,?)"
:INPUT OX,OY
9345 IFOX>PX OR OY>PY THENPRINT"SMALLER ORIGIN PLEASE"
:GOTO9340
9350 CLS:PRINT"X SCALE WOULD BE ";:FX=250/(LX-OX):PRIN
TFX:PRINT" PIXELS PER UNIT"
9370 PRINT"Y SCALE WOULD BE ";:FY=189/(LY-OY):PRINTFY:
PRINT" PIXELS PER UNIT"
9380 INPUT"PLEASE STATE SCALE DESIRED (X,Y)";IX,IY
9385 IFIX>FX OR IY>FY THENPRINT"SMALLER PLEASE":GOTO93
80
9390 FX=IX:FY=IY
9395 RETURN
9400 REM DRAW AXES OF GRAPH
9410 LINE(0,190)-(250,190),PSET:LINE(1,0)-(1,190),PSET
9420 FORN=1 TO 251 STEP 25
9430 LINE(N,191)-(N,192),PSET:NEXT
9440 FORN=190 TO 0 STEP-19
9450 LINE(0,N)-(1,N),PSET:NEXT
9490 RETURN
9500 REM SCALER FOR HISTOGRAM
9510 CLS:GOSUB9200
9520 PRINT"YOUR LARGEST X IS: ";LX
9530 PRINT"YOUR SMALLEST X IS: ";PX
9540 SB=B(1):LB=B(1):FORN=2 TO BN
9550 IFLB<B(N) THENLB=B(N)
9555 IFSB>B(N) THENSB=B(N)
9560 NEXTN
9570 PRINT:PRINT"YOUR FULLEST BIN CONTAINS: ";LB
9579 PRINT"YOUR EMPTIEST BIN CONTAINS: ";SB
9580 PRINT:PRINT"ENTER DESIRED ORIGIN (0,0 OR X,Y":INP
UTOX,OY
9585 IFOX>(INT(PX/BW)*BW) OR OY>SB THEN PRINT"TOO LARG
E, PLEASE RE-ENTER":GOTO9580
9590 PRINT:PRINT"YOUR X SCALE WOULD BE: ";:FX=250/(LX+
1-OX):PRINTFX
9600 PRINT"YOUR Y SCALE WOULD BE: ";:FY=187/(LB-OY):PR
INTFY
9610 PRINT:INPUT"SCALE FOR X,Y";IX,IY
9615 IFIX>FX OR IY>FY THENPRINT"TOO LARGE, PLEASE RE-E
NTER":GOTO9610
9620 FX=IX:FY=IY:RETURN
9800 REM CHI SQUARE EXTRAS
9810 C=A(1,1):D=A(2,1):E=A(1,2):F=A(2,2)
9815 SU=C+D+E+F
9820 C2=SU*((ABS(C*F-D*E)-(SU/2))^2)/((C+D)*(E+F)*(C
+E)*(D+F))
9830 PRINT"2 x 2 CONTINGENCY TABLE","CHI SQUARE VALUE
(1 D.F)","= ";:PRINTUSING"####.##";C2
9840 PRINT@416,"PRESS A KEY"
9850 A$=INKEY$:IFA$=""THEN9850
9860 CLS:PRINT"PRINTOUT (Y/N)"
9870 A$=INKEY$:IFA$=""THEN9870
9880 IFA$="Y"THENPRINT#-2:PRINT#-2,"2 x 2 CONTINGENCY
TABLE CHI SQUARE (";:PRINT#-2,USING"####.##";C2
9890 GOTO2000
9900 REM DATA CORRECTION
9910 CLS:FORN=1 TO NU
9920 PRINTN". X:";A(1,N),
9930 IFVN=2 THENPRINT"Y: ";A(2,N)
9940 FORD=1 TO 250:NEXT
9945 NEXTN
9950 PRINT@448,"PRESS A KEY":A$=INKEY$
9960 A$=INKEY$:IFA$=""THEN9960
9970 CLS:PRINT"WERE ANY WRONG?         ","TYPE NUMBER OF O
BSERVATION TO","BE CORRECTED.    ",,,,,:IF ALL CORRECT
, TYPE 0 (ZERO)    "
9980 INPUT"WHICH"; NN:IFNN=0 THENRETURN
9990 PRINT"NEW X FOR # ";NN:INPUTX
9995 IFVN=2 THENPRINT"NEW Y FOR # ";NN:INPUTY
10000 A(1,NN)=X:IF VN=2 THEN A(2,NN)=Y
10010 PRINT"ALL CORRECT? (Y/N)"
10020 A$=INKEY$:IFA$=""THEN10020
10030 IFA$="Y"THENRETURNELSE9910
10100 REM HISTOGRAM STATS
10110 HT=0:HX=0:HS=0
10120 CLS:PRINT"THINKING..."
10130 FORN=INT(PX/BW) TO INT(LX/BW)+1
10140 HT=HT+B(N)
10150 HX=HX+(B(N)*((N*BW-PX)-BW/2))
10160 HS=HS+(B(N)*(((N*BW-PX)-BW/2)^2))
10170 NEXTN
10175 CLS:PRINT"BIN WIDTH:","  ";BW
10180 PRINT"TOTAL:","  ";HT
10190 PRINT"MEAN:",:MX=HX/HT+PX:PRINTUSING"####.##";MX
10200 PRINT"VARIANCE:",:VX=(HS-(HX^2)/HT)/(HT-1):VX=(V
X-(BW^2)/12):PRINTUSING"####.##";VX
10210 PRINT"S.D.:",:DX=SQR(VX):PRINTUSING"####.##";DX
10220 PRINT@448,"DO YOU WANT A PRINTOUT? (Y/N)"
10230 A$=INKEY$:IFA$=""THEN10230
10240 IFA$<>"Y"THENPRINT@ 2:CLS:RETURN
10250 PRINT#-2,"HISTOGRAM STATISTICS":PRINT#-2
10260 POKE&HFF9,30
10265 PRINT#-2,"BIN WIDTH",:PRINT#-2,"  ";BW
10270 PRINT#-2,"MEAN",:PRINT#-2,USING"####.##";MX
10280 PRINT#-2,"VARIANCE",:PRINT#-2,USING"####.##";VX
10290 PRINT#-2,"STANDARD DEVIATION",:PRINT#-2,USING"##
##.##";DX
10300 RETURN
10500 REM PRINT GRAPHS
10510 IFPL<>1 THENCLS:PRINT"SORRY- YOU HAVEN'T LOADED
THE","PRINTER DUMP. QUITTING":STOP
10520 CLS:PRINT"SET PRINTER TO TOP OF NEW PAGE","THEN
PRESS A KEY"
10530 A$=INKEY$:IFA$=""THEN10530
10540 IFPEEK(&H74C0)=&H39 THENEXEC&H7400
10550 IFPEEK(&H74C0)=&H62 OR PEEK(&H74C0)=&H25 THENEXE
C&H7414
10560 PRINT#-2:PRINT#-2:PRINT#-2
10570 PRINT#-2,"X SCALE:",:PRINT#-2,USING"####.##";FX
10580 PRINT#-2,"Y SCALE:",:PRINT#-2,USING"####.##";FY
10590 PRINT#-2
10600 RETURN
10700 REM LOAD DRAWING PROGRAM
10710 CLS:PRINT"WHICH DRAWING PROGRAM?"
10720 PRINT:PRINT"CHOICE IS:",,"SMALL",,"MEDIUM",,"LAR
GE",,"LARGE X",,"FINE",,"FINE X",,,,"OR NONE"
10730 PRINT:INPUT"WHICH";A$
10740 IFA$="NONE" THENRETURNELSECLOADM A$:PL=1
10750 RETURN
```

■



UNBELIEVABLE SAVINGS

** COMPUTERS **

		EX VAT
APRICOT	F1-from	£875.00
APRICOT	Point 7 from	£2950.00
APRICOT	PORTABLE from	£1445.00
APRICOT	256K 315Kx2 MONITOR	£1395.00
APRICOT	256K 720Kx2 MONITOR	£1545.00
APRICOT	Xi 256k 10MB MONITOR	£2195.00
CIFER	9000 Multi User 21MB	£5095.00
COMMODORE	8250 DISKDRIVE	£795.00
COMMODORE	8296	£695.00
COMMODORE	SX-64 PORTABLE	£675.00
COMMODORE	64	£156.51
COMMODORE	DISK 1541	£135.21
COMMODORE	IBEK PARALLEL INTERFACE	£59.50
COMMODORE	1530 C2N CASSETTE	£32.00
COMPAQ		£1795.00
KAYPRO	II	£916.00
KAYPRO	10MB	£1995.00
OLIVETTI	M20 160KB 2x320KB Drives	£1295.00
OLIVETTI	M24 128KB 2x360KB Drives	£1658.00
OLIVETTI	M24 128KB 10MB Hard Disk	£3315.00
SAGE	II & IV	POA
SANYO	MBC 555 128K 2x160K Drives	£795.00
SIRIUS	256K 10MB	£2850.00
SIRIUS	256K 2.4MB	£2085.00
SIRIUS	128K 1.2MB	£1545.00
SIRIUS	Memory Expansions from	£222.00
SIRIUS	Express Accelerator Boards	POA
PLUS 5	External Hard Disk Drives	POA

** SOFTWARE **

ALL MAJOR SOFTWARE PROGRAMS SUPPLIED AT LOW COST

WORDSTAR	£195.00
OPEN ACCESS	£380.00
LOTUS 123	£295.00
SYMPHONY	£490.00
MULTMATE	£240.00
D BASE II	£290.00
DMS DELTA	£395.00
FRIDAY	£135.00
FRAMEWORK	£345.00

Not only do we offer top quality products at low prices. We also support and develop Software with the assistance of our long established software dept.

** MATRIX PRINTERS **

		EX VAT
ANADEX	DP-6500 500cps	£2919.00
ANADEX	WP-6000	£1806.00
BROTHER	EP44	£199.00
BROTHER	HR5	£129.00
CANON	PW1080A 160cps (NLQ)	£279.00
CANON	PW1156A 160cps (NLQ)	£339.00
EPSON	RX 80T 100cps	£195.00
EPSON	RX 80F/T 100cps	£220.00
EPSON	FX 80 160cps	£324.00
EPSON	FX 100F/T 160cps	£430.00
EPSON	LQ 1500 200cps (NLQ)	£895.00
HONEYWELL	From	£375.00
MANNESMANN	MT80 80cps	£199.00
MANNESMAN	MT160 160cps (NLQ)	£590.00
NEC	PINWRITER P2(P)	£535.00
NEWBURY	DRE 8850 300lpm	£2095.00
NEWBURY	DRE 8925 240cps	£1385.00
OKI	82A 120cps	£255.00
OKI	84A 200cps	£630.00
OKI	OKI 82P 130cps	£279.00
OKI	OKI 2410P 350cps	£1535.00
SEIKOSHA	GP100A	£165.00
SHINWA	CP80 Model II FT	£175.00
STAR	DELTA 10 160cps	£319.00
STAR	DELTA 15 160cps	£435.00
STAR	GEM NI 10X 120cps	£189.00
STAR	GEM NI 15X 120cps	£285.00
STAR	RADIX 10 200cps (NLQ)	£449.00
STAR	RADIX 15 200cps (NLQ)	£549.00
TEC	1550 120cps	£465.00
TOSHIBA	TH2100H 192cps	£1275.00
TREND	930 200cps NLQ 80cps	£1350.00

MAYFAIR MICROS

BLENHEIM HOUSE, PODMORE ROAD, LONDON SW18 1AJ

TEL: 01-870 3255

We accept official orders from UK Government and Educational Establishments. Mail Order and Export Enquiries welcome. Callers by appointment.

** DAISYWHEEL ** ** PRINTERS **

		EX VAT
BROTHER	HR1	£445.00
BROTHER	HR15	£329.00
BROTHER	HR15 Keyboard	£135.00
BROTHER	HR15 Sheetfeeder	£185.00
BROTHER	HR15 Tractor Feed	£62.00
BROTHER	HR25	£549.00
DAISYSTEP	2000 20cps	£240.00
DIABLO	630 API	£1315.00
DIABLO	Sheet Feeder	£490.00
JUKI	6100 18cps	£325.00
NEC	2010 Serial 20cps	£545.00
NEC	2030 Parallel 20cps	£545.00
NEC	3510 Serial 35cps	£1049.00
NEC	3530 Parallel 35cps	£1049.00
NEC	7710 Serial 55cps	£1440.00
NEC	7730 Parallel 55cps	£1440.00
QUME	11/40 RO	£1185.00
QUME	11/55 RO	£1370.00
QUME	9/45 RO	£1550.00
QUME	9/55 RO	£1900.00
RICOH	RP1300S	£895.00
RICOH	RP1600S	£1190.00
RICOH	RP1600S FLOWRITER 8k	£1249.00
RICOH	RP1600S FLOWRITER 8k IBM PC	£1299.00
RICOH	RP1600S Sheet Feeder	£459.00
RICOH	RP1600S Tractor	£138.00
SMITH CORONA	TP1 12cps	£195.00
TEC	STARWRITER F1040 40cps	£895.00
TEC	STARWRITER F1055 55cps	£1235.00
TEC	Sheetfeeder	£459.00
TEC	Tractor	£138.00

** VDU's & TERMINALS **

CIFER	T4	£760.00
HAZELTINE	ESPRIT Fixed Keyboard	£395.00
QUME	QVT103 (VT100 VT131)	£595.00
TELEVIDEO	910	£489.00

** PLOTTERS **

MANNESMANN	PIXYPLOTTER	£495.00
GOULD	PLOTTER	POA

THE BOSS

CBM64 £8.95/48K Spectrum/48K Atmos £6.95

THE TOP 20 SMASH HIT!

The most complete, compulsive and entertaining football management game ever!
*4 divisions *FA Cup *European Cup *European Cup-Winners' Cup *Replays *Promotion/Relegation *Transfers *Suspensions *Injuries *Substitutes *Name team *Team selection *Name players *Choose/change team formation *Weekly league tables *Fixtures/Results table *Reserve squad *Spy on other clubs *Minute-by-minute goal facts

Check with your retailer, clip the coupon or phone your Access number. All orders posted within 24 hours.

PEAKSOFT, 48 QUEEN STREET, BALDERTON, NEWARK, NOTTS. Tel: 0636 705230

Rush me The Boss for my CBM64/48K Spectrum/48K Atmos. I enclose a cheque or P.O.

Name ....

Address ....

....

NEW

SPECIAL OFFER for CBM 64

80-COLUMN/GRAFICCARD

CBM64

- Digital clock
- Mixpossibility of 80-column screen with Hires CBM64-screen (also in colour)
- Grafic pictures can be switched to background
- Upper line can be locked (for comments etc.)
- Adjustable line spacing for greater clarity on text screens

FREE ADDED!: Sophisticated Wordprocessor with extended manual

£ 59.95

* Warning: Beware of (inferior) imitations of ZERO-products!

...Surprising bargains for VIC 20 and CBM 64

- EXPANSION UNIT with 2 slots £ 5.95
- EPROM CARD two 2k/4k EPROM sockets. Addresses are changeable £ 5.95
- 40/80 COLUMN CARD — Turn your VIC 20 into a professional computer. 40 or 80 columns instead of 22, very sharp and stable picture. Try it out without obligation! £ 55.95
- EPROM PROGRAMMER for 2716, 2732, 2764, 27128, 2532 EPROMS. Can be easily connected to your computer. Control software in EPROM £ 6.54 — £ 31
- 64 k RAM + 2 k EPROM — With software for RAM-files. Easily connected. £ 55.95
- EPROM-ERASER erases 4 EPROMS simultaneously £ 26.50
- EXPANSION UNIT — With 5 slots, fully buffered, switches for disabling slots, and on-board power supply. VIC 20 £ 29.95 * CBM64 £ 36.95
- MACH3 PRINTER BUFFER

	16k	32k	48k
par. input - par. output	£ 86	£ 98	£ 109
serial input - par. output	£ 94	£ 109	£ 123

for all our products: Dealer inquiries invited

ZERO ELECTRONICS

- All prices exclude VAT. Shipping costs £ 1.50
- Supplier to schools, universities and government departments.
- We have good documentation of all our products, free of charge.
- All equipment can be tried out without obligation; if returned undamaged within 10 days you only pay postage and packing costs.

149 KINGSTREET • GT. YARMOUTH NR30 2PA • TEL: (0493) - 2023
(NASH HOUSE)

ANSWER BACK
SENIOR
QUIZ
GENERAL KNOWLEDGE

THE ULTIMATE EDUCATIONAL QUIZ FOR AGES 12 & OVER

BBC (32K)•ELECTRON

The ANSWER BACK Quiz provides an incredible adventure in education by combining a compelling Space-Age game with an immense series of questions on General Knowledge. The thought-provoking and well-researched quizzes contain an enormous total of 750 questions with 3000 answer options covering the following subjects:

☐ Astronomy ☐ Music ☐ Natural History ☐ Famous People ☐ Science ☐ Sport ☐ History ☐ Art and Architecture ☐ Know your Language ☐ Discoveries and Inventions ☐ Legends and Mythology ☐ Geography ☐ Literature ☐ Films, TV and Theatre ☐ Pot Luck

The highly sophisticated control program rewards each correct answer with another turn in the colourful, animated game.

FEATURES INCLUDE

☐ Multiple choice answers ☐ True or false? ☐ Find the missing letters ☐ "Pass" facility ☐ Immediate correction of errors ☐ Timer option ☐ Performance summary ☐ Re-run of questions passed or incorrectly answered ☐ Full facilities for creating and saving an unlimited number of new quizzes

Available from your computer store or by mail order Price £10.95.

AVAILABLE SHORTLY:
ANSWER BACK
Junior Quiz
for the under 11's





Other educational titles include...
'The French Mistress'
'The German Master'
'The Spanish Tutor'



The ANSWER BACK Senior Quiz will educate and fascinate ANYONE over 11 years old.

KOSMOS SOFTWARE, 1 Pilgrims Close, Harlington, DUNSTABLE Beds. LU5 6LX

Please send me the ANSWER BACK Senior Quiz for the BBC/ELECTRON computer.

Mr/Mrs/Miss..............................

Address..............................

....

.... Post code..............................

I enclose a cheque/postal order for £10.95 payable to KOSMOS Software

HEARING IS BELIEVING
Tele Sound
SPECTRUM BEEP BOOSTER

TELESOUND is ready built and tested so that you can get the full sound of your Spectrum through any unmodified television set, black and white or colour. The unit is easy to fit in minutes without any previous experience as full fitting instructions are provided.

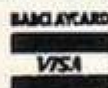
TELESOUND has been designed using the very latest ultra miniature components so it's size is an **incredible 2x1.3x1cm. and fits neatly inside the Spectrum.** Three easy push-on connections are made to the Spectrum. The connections are clearly shown in a diagram that comes with full fitting instructions.

TELESOUND FEATURES

- SOUND AND VISION TOGETHER FOR ADDED REALISM.
- BEEP VOLUME CONTROLLABLE FROM A WHISPER TO A ROAR.
- KEYBOARD CLICK CLEARLY HEARD TO ASSIST PROGRAM ENTRY.
- PROGRAMS CAN BE HEARD WHEN BEING LOADED • NO SOLDERING OF CASE CUTTING REQUIRED.
- ADDITIONAL AMPLIFIER NOT NECESSARY • SEPARATE POWER SUPPLY NOT REQUIRED.
- USES NO MEMORY SO WORKS WITH ALL PROGRAMS • COMPATIBLE WITH ALL OTHER ADD-ONS INCLUDING MICRODRIVE

TELESOUND comes complete with easy to follow fitting instructions and costs £9.95 inclusive of post, packing etc. Please state your computer when ordering.

COMPUSOUND



Overseas and Trade Enquiries Welcome



DEPT:YC10 32 - 33 LANGLEY CLOSE, REDDITCH, WORCESTERSHIRE. B98 0ET. TELEPHONE: (0527) 21429 (21439 Answerphone)

***Commodore-64**
***Dragon 32/64**
***Atari 400/600/800 (48K)**
***Acorn Electron**
***BBC Model/B**
***Tandy c/c (32K)**

747 Flight Simulator

from DACC — The Simulation specialists



Actual screen photograph (BBC version)

Unrivalled and unbeatable for accuracy and realism — the DACC 747 Flight Simulator is the most successful of its kind on home computers. The only simulator which shows all the essential flight and engine instrumentation of the Jumbo Jet, as they really are — real dials — and with a precise 3D view of the runway. The control and response of the 747 are faithfully reproduced using genuine aero-dynamics formulae. Start options include take-off, random landing approach, passenger and fuel load selection, etc. You control the throttles, elevators, ailerons, flaps, spoilers, landding gear, brakes, reverse thrust, etc. Joysticks are optional on all but Dragon and Tandy versions.

Cassette £9.95 (inc. VAT and P&P)

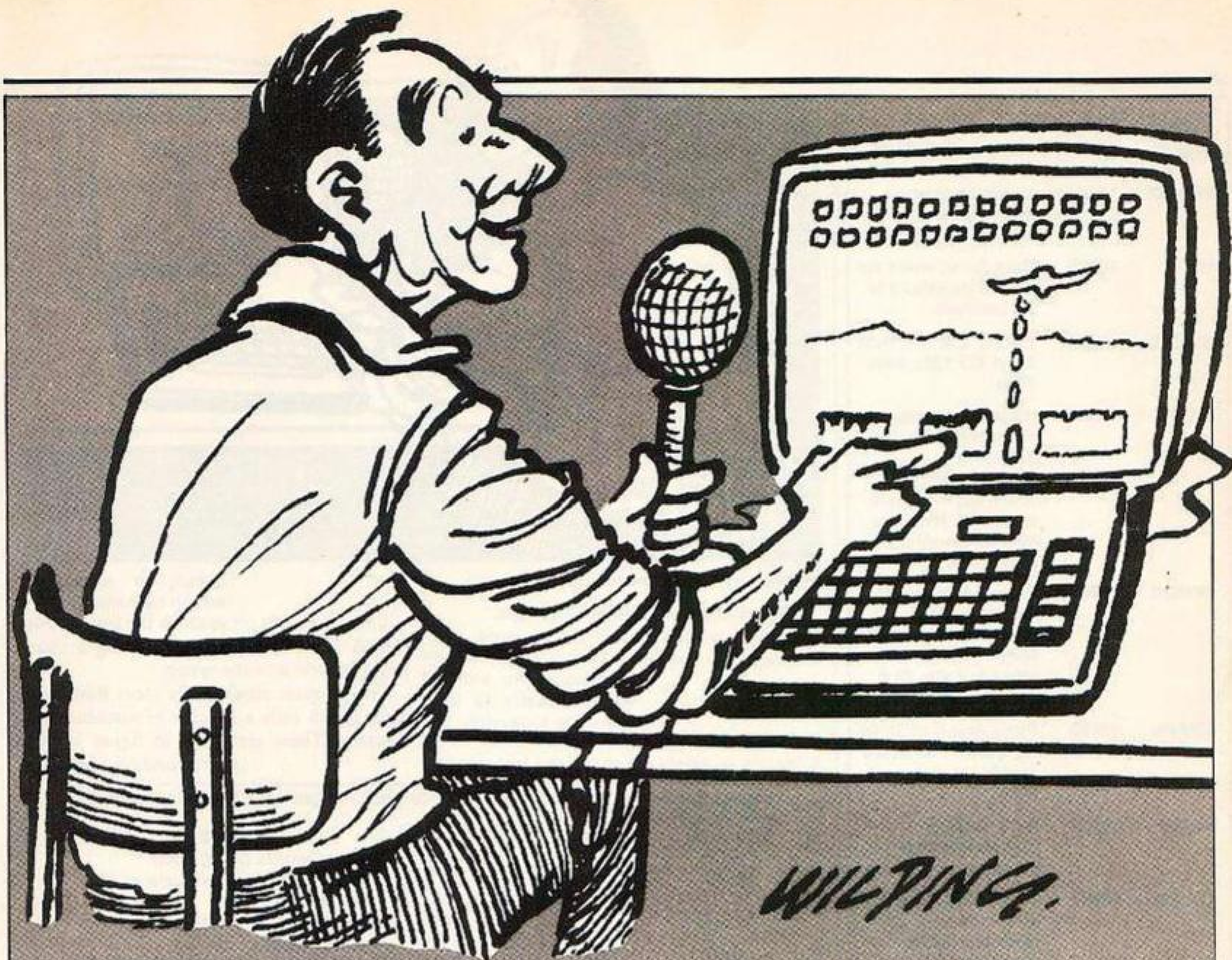
*****SPECIAL OFFER*****

Free PVC dust cover for your home computer when you order the 747 Flight Simulator. (Limited Period)

WE DESPATCH WITHIN 48 HOURS

Order direct from:

DACC Ltd. (Dept YC2)
23, Waverley Road, Hindley, Nr. Wigan, Lancs. WN2 3BN.



VOICE RECOGNITION

Now you can shout at your micro and it will listen. Be careful what you say — ZX-81s have feelings too. Jason Creak explains.

VOICE RECOGNITION is a subject which, although seeming easy using the processing powers of modern computers, is in practice very difficult to achieve. This is mainly due to the variation of the human voice. On home computers, recognition is normally achieved by using a special piece of hardware such as the BBC Big Ears unit, but this program does without extra hardware, simply using your tape recorder as an amplifier.

The program, although complete in itself, is designed to allow the user to experiment with voice recognition, and thus use the basic routines in his/her own programs.

To key in the program, first type in a Rem statement containing at least 450 characters. Use:

POKE 16510,0

to prevent deletion. Then type in listing 1 — the hex. loader — and use it to enter the machine code. The routine will stop when the code is complete. Then:

POKE 16514,118
POKE 16515,118

to prevent listing of the Rem. Next make several tape copies so that you do not lose the code if it crashes, delete and loader and enter listing 2. Then:

POKE 16514,33
POKE 16515,123

The program is now complete.

Do not list the Rem statement or the machine will go into a continuous listing loop.

Next you must set up the tape recorder. Insert a long, blank tape into the tape recorder and set it to the Record mode. Connect the recorder and ZX-81 as for loading but disconnect any lead to the Mic socket of the recorder. The system works by using the recording monitor function most tape recorders have.

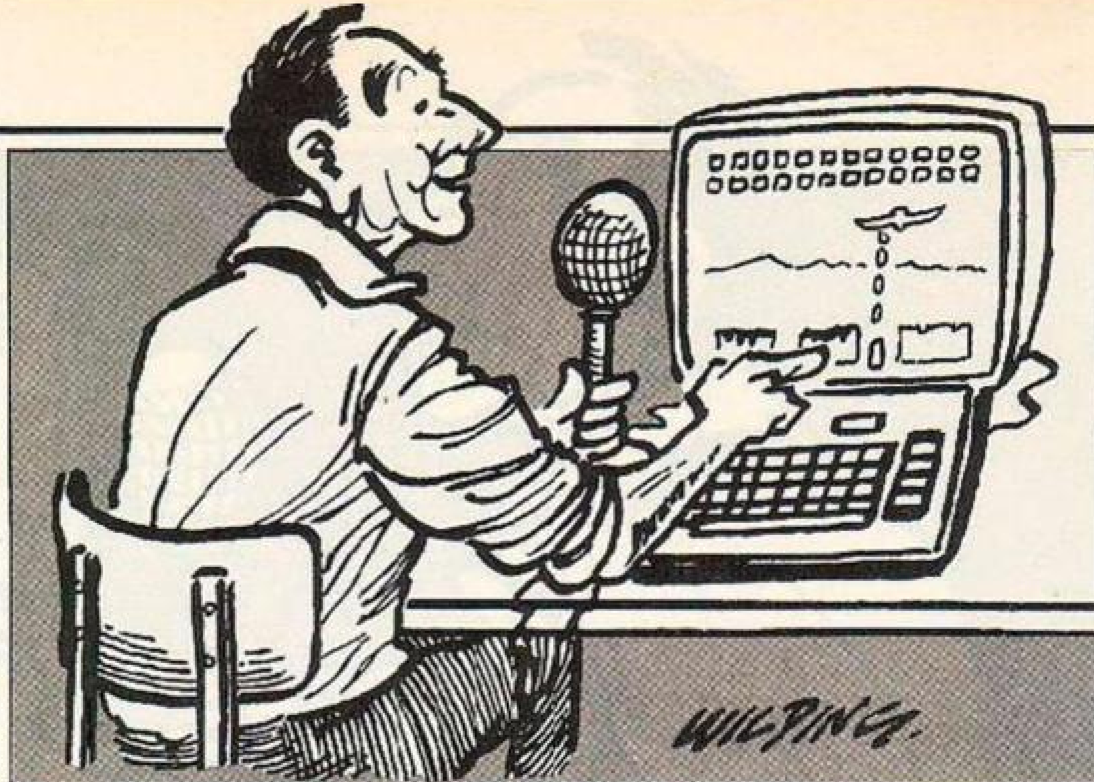
If you have a separate microphone use that. Otherwise you can usually speak into the built-in microphone. If you have a tape recorder with adjustable recording levels use that with the levels set up correctly. This gives better response as it does not have the automatic level control which can corrupt the sounds in some cases.

First you must input the words you wish to store. Start with two simple words e.g., hello, goodbye. Each word is input five times when stored to achieve the best accuracy, and is stored in an array Z$. When you have input all the words you wish to store you go to the recognition routine. After the recognition sound input, the word that you said is displayed, together with the conformity — out of 128 — of your speech to that word.

(continued on next page)

Figure 1. Routines.

NAME	ST.ADDR	USE AND NOTES
IN-SND	16514	Loads frequency and volume at ear socket into (16507).
WAIT	16532	Sets Slow; waits for sound threshold to be reached.
SOUND	16546	Enters a sound into Z$ (1 TO 128); Sets Fast.
INPUT	16586	Inputs 5 sounds, averages, and enters to Z$(641 + 128*n TO 768 + 128*n) where n = PEEK 16417 (No. of word); Calls CLS, Slow.
RECOG	16700	Enters a sound; No. of most similar word returned; Conformity entered to (16417); Calls CLS, Slow.
GRAPH	16779	Plots graph of word no. (16417) on scale 1: (16833); Sets Slow.
NOISE	16863	Sets Slow; waits for no sound to be present.
ADJ-SND	16877	Calls Sound; Adjusts sound blueprint for increase accuracy.
SND?	16922	Returns 1 if sound present, else 0.
GLR	16940	Clears top 4 screen lines.



(continued from previous page)

You are then given a list of options:
1 Continue — return to testing routine.
2 Change — re-enter a word — if you want to change the stored sound, usually to improve the blueprint.
3 Re-Run start again.
4 Graphs — prints graphs of the last sound input, or a stored sound by name.

The cursor will move down the list and you should select an option by making a short sharp whistle into the system.

The program consists of a short Basic program which calls a number of machine-code routines. These are listed in figure 1 with

(continued on page 146)

Figure 2. Variable locations — These can be changed for different recorders, sounds and voices.

ADDRESS	NAME	INIT.VALUE	USE
16508	Words	?	No. of words being used.
16542	Snd.threshold	56	Determines when volume at ear socket is a sound.
16574	Length	3	Determines the length of the sound input.
16741	Diff.	22	Determines difference needed for high/low volumes.
16833	Scale	4	Vertical scale divisor for graphs.
16901	P-Diff.	10	Used in ADJ-SND. A lower no. should be used for 'purer' voices.
16947	Lines	128	32*no. of cleared lines.

Listing 1.

```
 99 REM HEX LOADER
100 PRINT "START ADDRESS"
110 INPUT S
120 PRINT "FINISH ADDRESS"
130 INPUT F
140 FOR N=S TO F STEP 8
150 LET T=0
160 PRINT N;" - ";
170 INPUT A$
180 PRINT A$;" = ";
190 INPUT TOT
200 PRINT TOT
210 LET Z=0
220 FOR K=1 TO LEN A$ STEP 2
230 LET C=(CODE A$(K)-28)*16+CO
DE A$(K+1)-28
240 LET T=T+C
250 POKE N+Z,C
260 LET Z=Z+1
270 NEXT K
280 IF TOT=T THEN GO TO 310
290 PRINT "ERROR - PLEASE INPUT
AGAIN"
300 GO TO 150
310 NEXT N
```

Listing 2.

```
   5 CLS
   7 PRINT TAB 5;"**VOICE RECOGN
ITION**",,,,,
  10 PRINT TAB 3;"HOW MANY WORDS
?"
  20 INPUT W
  30 IF W>15 THEN RUN
  40 POKE 16508,W
  50 CLEAR
  60 DIM Z$(768+128*PEEK 16508)
  70 LET W=PEEK 16508
  80 CLS
  90 DIM W$(W,10)
 100 FOR N=1 TO W
 110 PRINT "ENTER WORD ";N
 120 INPUT W$(N)
 130 GOSUB 2000
 140 NEXT N
1000 CLS
1010 PRINT TAB 6,"< TESTING ROUT
INE >"
1020 RAND USR 16863
1030 PRINT AT 6,3;"SPEAK WHEN YO
U ARE READY."
1040 LET L=USR 16700
1050 PRINT "THE WORD WAS: ";W$(L)
1050 PRINT ,,,,"CONFORMITY= ";PE
EK 16417
1100 PRINT ,,,,TAB 4;"MAKE A NOI
SE TO CONT."
1110 RAND USR 16863+USR 16532
1150 FAST
1160 CLS
1170 PRINT TAB 7;"█** CONTINUE"
1180 PRINT TAB 7;"█** CHANGE"
1190 PRINT TAB 7;"█** RE-RUN"
1200 PRINT TAB 7;"█?? LAST VOICE
"
```

(listing 2 continued on page 146)

(continued from page 144)

their uses and parameters. If you wish to use the routines yourself, make sure Z$ is setup by:

CLEAR
DIM Z$ (768 + 128*n)

where n is the number of words to be stored.

If you find the computer always — or never — thinks a sound is present, change the sound threshold i.e., the point when the noise heard is loud enough to be a sound. This depends on the auto-level control on your tape recorder. A lower value means less volume is required to be a sound. Similarly, adjust Scale to make the graphs fit the screen neatly. Another location which can be changed is 16557.

POKE 16557,33

will make the sound input in Slow, thus retaining the display.

POKE 16557,205

will revert it to a Fast input.



(listing 2 continued from page 144)

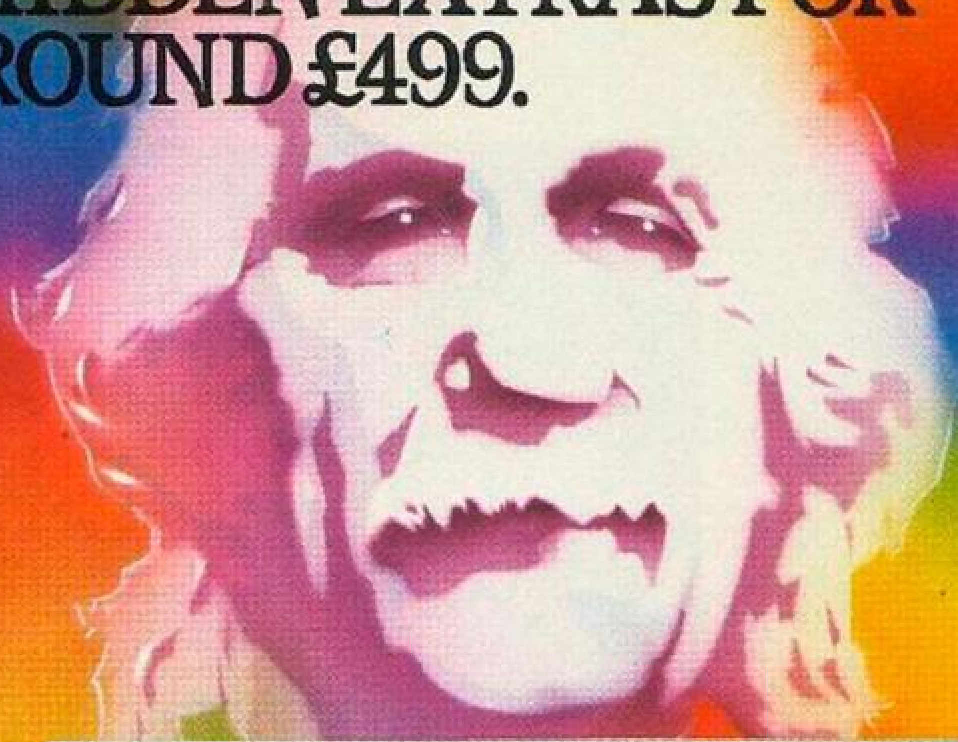
```
1210 FOR T=1 TO W
1220 PRINT TAB 7;"█";(" " AND T<
10);T;" ";W$(T)
1230 NEXT T
1240 SLOW
1250 FOR T=0 TO 3+W
1260 PRINT AT T,10;"█"
1270 FOR A=1 TO 15
1280 IF USR 16922=1 THEN GOTO 13
30
1290 NEXT A
1300 PRINT AT T,10;" "
1310 NEXT T
1320 GOTO 1250
1330 IF T<3 THEN GOTO (1000 AND
T=0)+(1500 AND T=1)+(5 AND T=2)
1340 LET T=T-3
1350 LET E$=(" LAST VOICE" AND T
=0)+(": "+W$(T+(T=0)) AND T>0)
1360 POKE 16417,T
1370 RAND USR 16779
1380 PRINT "GRAPH OF";E$
1390 GOTO 1100
1500 PRINT AT USR 16940,5;"WHICH
 SOUND ? --"
1510 FOR T=4 TO 3+W
1520 PRINT AT T,10;"█"
1530 FOR A=1 TO 15
1540 IF USR 16922=1 THEN GOTO 15
90
1550 NEXT A
1560 PRINT AT T,10;" "
1570 NEXT T
1580 GOTO 1510
1590 LET N=T-3
1600 GOSUB 2000
1610 GOTO 1150
2000 CLS
2010 PRINT AT 6,3;"SPEAK WHEN YO
U ARE READY"
2020 POKE 16417,N
2030 RAND USR 16586
2040 RETURN
9998 SAVE "V█"
9999 RUN
```

Hex dump.

```
16514: 217B403E007705FF = 662
16522: DBFEFEFF20013410 = 1083
16530: F7C9CD2B0FCD8240 = 1110
16538: 3A7B40FE3038F6C9 = 1050
16546: 2A10400106000 9E5 = 367
16554: CD9440CD230FE10E = 911
16562: 80E5CD8240E13A7B = 1162
16570: 4077231603AF3D20 = 511
16578: FD1520F90D20EAC9 = 1035
16586: ED4B104021860009 = 568
16594: 545D210600090605 = 236
16602: E5C5D5E5CDA240E1 = 1524
16610: D1018000EDB0C1E1 = 1169
16618: 10FE2A1040E51186 = 758
16626: 02193A2140471180 = 398
16634: 001910FDE3118600 = 572
16642: 19D10E80FD210000 = 562
16650: E50605C506004EFD = 774
16658: 0901800009C110F3 = 599
16666: C50105 00FDE5E13E = 972
16674: FF3CA7ED4230FA12 = 1101
16682: 13C1E1230D20D5FD = 900
16690: 210040CD2A0ACD2B = 502
16698: 0FC9CDED41ED5B10 = 1067
16706: 402106 0019E52106 = 396
16714: 0319D13A7C40473E = 616
16722: 003221400E00C506 = 364
16730: 800E00D51A963002 = 581
16738: ED44FE1630010C13 = 661
16746: 2310F1D13A2140B9 = 841
16754: 79C1300448322140 = 585
16762: 10DC3A7C403C914F = 766
16770: C5CD2A0ACD2B0FC1 = 910
16778: C9CD230FCD2A0A2A = 755
16786: 3040E53E98323040 = 717
16794: 2A1040110600193A = 228
16802: 2140FE0028091180 = 545
16810: 00C505471910FD06 = 574
16818: 400E00C55E7B2386 = 661
16826: 23E51F060004D604 = 523
16834: 30FBC505CDE508C1 = 1091
16842: 10F8E1C10C10E4E1 = 1163
16850: 223040CD2B0F0100 = 410
16858: 00CDF508C93E3032 = 819
16866: 9F40CD9440CE3832 = 808
16874: 9F40C9CDA240FD2A = 1150
16882: 1040110700FD1906 = 388
16890: 7DFD7E01FD86FF1F = 1178
16898: 4FFD96003002ED44 = 837
16906: FE0A3803FD7100FD = 942
16914: 2310E6FD210040C9 = 832
16922: CD824001000003A9E = 616
16930: 40573A7B40BA3801 = 639
16938: 0CC9010000CDF508 = 672
16946: 06803E00C5D7C110 = 817
16954: F9C9 = 450
```

■

A COMPLETE COLOUR MICRO WITH NO HIDDEN EXTRAS FOR AROUND £499.





The title of 'genius' is not bestowed lightly on man or machine: those extraordinary qualities and powers of intellect are rare.

Einstein had them in full measure. And so now does the new micro computer from Tatung, designed and built in Britain and appropriately named – Einstein.

Einstein was created by Tatung, one of the world's leading electronic companies, and given the capacity and the remarkable capabilities to compete with computers costing far more.

Its simplicity of operation will appeal to the first time buyer and to businessmen who don't want to lose staff to expensive and time-consuming training courses. At the same time its operating system is both powerful and sophisticated to satisfy the most advanced requirements.

For those who have outgrown their existing primitive machine, the speed and capacity of the 500K built-in disc drive will make all the difference. And for the small businessman, the ability to store and retrieve all information in seconds will be as important as Einstein's built-in flexibility, which allows the system to grow as the business develops.

BUILT-IN 80K MEMORY
Total memory capacity 80K RAM divided into 64K 'user' memory and 16K for colour graphics production.



BUILT-IN DISC DRIVE
500K 3" compact floppy disc drive. Potential for massive extra storage with a second 500K disc drive internally.

BUILT-IN 16 COLOUR GRAPHICS High resolution graphic animation from 32 sprites (definable shapes), 16 vivid colours.

BUILT-IN EXPANSION PORTS
Connection to both TV and optional colour monitor, most printers and other computers via RS232C interface. Also twin joystick ports, 8 bit user port, exclusive Tatung Pipe.

BUILT-IN FLEXIBILITY
Powerful Crystal BASIC. Multi-lingual plus ability to run CP/M.

BUILT-IN VERSATILE SOUND
Sound synthesiser facility includes chromatic music with three voices. Substantial speaker with volume control. Provision for speech synthesiser.

Einstein has them all. Feature for feature, it meets the need of the novice and the experienced operator, both at home and i the office.

Einstein, designed and built in Britain, is a complete colou micro computer with no hidden extras.

And for under £500 is sheer genius.

TATUNG
Einstein
SHEER GENIUS: AT WORK, AT HOMI

DIAL 100 AND ASK FOR FREEFONE EINSTEIN FOR YOUR NEAREST STOCKIST.

*CP/M is a trade mark of Digital Researc

Fintan Culwin simulates a joystick on the BBC.

IF YOU ARE any older than 12 you will find that most of the action games published are far too fast for your benighted brain cells. This problem is compounded if the programmer has not been kind enough to include a joystick option in the program. Having to contort one's arthritic fingers about a keyboard only serves to underline the effects of age.

An example of this is Acorn's Planetoid. I am convinced that the Hyperspace option is a suble joke on the part of the programmer as it is virtually impossible to reach the relevant key in time to avoid destruction.

The utility presented here occupies less than one page of memory and allows up to five key presses per stick to be simulated by the positioning of the stick. This has two more serious applications; first, in combination with a word processor or spreadsheet it allows an alternative and useful means of input. Secondly it can be incorporated into your own programs to save memory or to avoid the necessity of having to program your own joystick handling routine.

The specification for the system is to allow one or two joysticks to be configured to intercept five or 10 negative Inkey calls and

(listing continued on page 151)



However flash your joystick — like this wire-less infra-red Cheetah Rat — you will still need something to plug into the back of your computer.

KEYSTICK

Keystick listing.

```
   10 REM THIS IS A DUMMY TO ACCOUNT FOR ACCIDENTS
  100 PROC_PREPARE
  110 PROC_EXECUTE
  111 STOP
  120 PROC_TEST
  500 DEF PROC_PREPARE
  510 PROC_CHOICES
  520 PROC_INPUTS
  530 PROC_CONPLEMENT
  590 ENDPROC
  600 DEF PROC_CHOICES
  610 CLS
  620 FOR N% = 0 TO 1
  630 PRINTTAB(10,N%);CHR$(141);"KEYSTICK"
  640 NEXT
  650 PRINTTAB(2,6)"One or two sticks ?"
  660 PRINT TAB(2,7)"(1/2) ?";
  665 response% = GET
  670 IF response% <> 49 AND response% <> 50 THEN 660
  680 PRINTCHR$(response%)
  690 IF response% = 49 THEN both% = FALSE ELSE both%
= TRUE
  700 PRINT TAB(2,9)"Address for the code to be assemb
led"
  710 INPUT TAB(2,10)'&"address$
  720 address$ = "&"+address$
  730 address% = EVAL(address$)
  750  PRINTTAB(2,12)'Filename to be chained "
  760 INPUTTAB(2,13)filename$
  770 filename$ = "R.'+filename$
  810 IF NOT FN_O_K THEN PROC_CHOICES
  820 ENDPROC
  900 DEF PROC_INPUTS
  910 PROC_ONE_SET("LEFT")
  920 left_left$= left$
  930right_left$ = right$
  940up_left$ = up$
  950down_left$ = down$
  960fire_left$ = fire$
  970IF NOT both% THEN ENDPROC
  980PROC_ONE_SET("RIGHT")
  990 left_right$=left$
 1000right_right$=right$
 1010up_rights=up$
 1020down_right$=down$
 1030fire_right$=fire$
 1040ENDPROC
 1100DEF PROC_ONE_SET(string$)
 1101 CLS
 1110 t_string$ = string$ +" STICK"
 1130FOR N% = 0 TO 1
 1140 PRINTTAB(8,N%)CHR$(141);t_string$
 1150NEXT N%
 1160PRINT TAB(2,4)"UP     -"
 1170PRINTTAB(2,6)"DOWN   -"
 1180PRINTTAB(2,8)"LEFT   -"
 1190PRINTTAB(2,10)"RIGHT  -"
 1200PRINTTAB(2,12)"FIRE   -"
 1210INPUTTAB(9,4) up$
 1220INPUTTAB(9,6) down$
 1230INPUTTAB(9,8) left$
 1240INPUTTAB(9,10)right$
 1250INPUTTAB(9,12)fire$
 1260 IF NOT  FN_O_K  THEN PROC_ONE_SET(string$)
 1270 ENDPROC
 1300 DEF PROC_COMPLEMENT
 1310left_left% = FN_COMPLEMENT(left_left$)
 1320right_left% = FN_COMPLEMENT(right_left$)
 1330up_left% = FN_COMPLEMENT(up_left$)
 1340down_left% = FN_COMPLEMENT(down_left$)
 1350fire_left% = FN_COMPLEMENT(fire_left$)
 1360IF NOT both% THEN ENDPROC
 1370left_right% = FN_COMPLEMENT(left_right$)
 1380right_right% = FN_COMPLEMENT(right_right$)
 1390up_right% = FN_COMPLEMENT(up_right$)
 1400down_right% = FN_COMPLEMENT(down_right$)
 1410fire_right% = FN_COMPLEMENT(fire_right$)
 1420ENDPROC
 2000 DEF PROC_EXECUTE
 2010 PROC_INITIALISE
 2015  FOR opt% = 0 TO 3 STEP 2
 2020 PROC_SETUP
 2030 PROC_DATA_BLOCKS
 2040 PROC_CONTROL
 2045 NEXT opt%
 2050 ENDPROC
 2100 DEF PROC_INITIALISE
 2110OSWRCH = &FFEE
 2120OSBYTE = &FFF4
 2125 OSCLI = &FFF7
 2130BYTEV = &20A
 2140IF both% THEN sticks% = 9 ELSE sticks% = 4
 2190ENDPROC
 2200 DEF PROC_SETUP
 2210P% = address%
 2220[ OPT opt%
```

(listing continued on page 151)

Find out why YOUR COMPUTER is Britain's biggest selling computer magazine — subscribe today!



Forget the crowds clamouring at the newstands to buy the latest copy of Your Computer; forget that frustrated feeling when you discover the last copy in your newsagent has been sold. Instead take some positive steps to avoid disappointment. Take out a year's subscription to Your Computer today and enjoy the privilege of receiving your favourite home computer magazine every month in the comfort of your own home. **Simply fill in the form below and return it to the address stated, today.**

YOUR COMPUTER SUBSCRIPTION ORDER FORM

Please send me YOUR COMPUTER each month for 12 months

A. I enclose cheque/PO to the value of £1[illegible].50 (UK) £18.50 (Overseas). Cheques should be made payable to Business Press International Ltd. Air mail rates available on request.

B. Please debit my credit card account:

Enter number: | | | | | | | | | | | | | | | |

(please tick)

Access ☐ Barclaycard/Visa ☐ Diners Club ☐ American Express ☐

Signed________________ Date________

NAME:________________

ADDRESS:________________

Job Title (if any)________________

Type of Business (if any)________________

Do you own a computer? Yes☐ No☐

Do you have access to a computer? Yes☐ No☐

If so please state type________________

Please return to: Your Computer, Subscription Manager, Business Press International Ltd., Oakfield House, Perrymount Road, HAYWARDS HEATH, Sussex, RH16 3DH

(continued from page 149)
return True depending upon the state of the fire button or the exact position of the selected stick.

If only one stick is selected then the left one will be chosen. Once installed, if the joystick option is not required, the stick can be parked in a neutral position and the keyboard used. All of this is done using legitimate Acorn documented calls and will be compatible with Tube operation or with other correctly written utilities and systems.

The system takes up one page of memory; not necessarily commencing on a page boundary (XXOO Hex); will have to be located which the application system does not use. A method of doing this is given in table 1. The negative Inkey numbers for the relevant keys will have to be established — User Guide page 275; and the name of the loader program noted.

This information is needed to set up the system; which will produce a file establishing itself within the operating system and *Running the loader program. The information will have to be entered as requested as the introductory section asks for it. Once all the information has been entered the main part of the program will use it to assemble the file.

Table 1. Finding the spare page.

- ☐ Type in as a direct command
  FOR N% = &DOO TO HIMEM STEP 4:!N% = &41414141: NEXT
  This fills all available memory with Byte 41
- ☐ Load and Execute the program to be converted
- ☐ Enter the following program
  10 N% = &DOO : REPEAT IF ?N%<>&42 THEN 30
  20 M% = N% − 4 : REPEAT M% = M% + 4 UNTIL !M%<>41414141 OR M% − N%> 256:IF M% − N%> 256 THEN PRINT" ADD = "~ N%
  30 N% = N% + 4 : UNTIL N% > HIMEM
  This should result in an address being suggested. If no address is suggested then there is not enough unused memory available.

Once assembled the program enters a self-test routine allowing the code to be checked. When the routine has been tested pressing Escape will exit to an option allowing the file to be saved.

For those of you with no wish to delve into the operating system and precise details of the file can start typing now. The most obvious way to test the keyboard in most applications is to use a negative Inkey call. This, by itself, locks out the rest of the keyboard and allows a range of options to be entered on each pass through the main loop of a program.

A basic Inkey statement with a negative parameter will at some level translate into an Osbyte call; machine-code programs will use the call directly. All Osbyte calls jump through a RAM memory location. Initially this points straight back into ROM; but by changing the contents of this location the call can be redirected to a different routine.

The precise call we are interested in is Osbyte call &81 indicating an Inkey request; with the Y register containing &FF indicating

(continued on next page)

(listing continued from page 149)

```
2230   .setup%       LDA BYTEV
2240                 STA REVEC
2250                 LDA BYTEV+1
2260                 STA REVEC+1
2270                 LDA #(main% MOD 256)
2280                 LDX #(main% DIV 256)
2290                 STA BYTEV
2300                 STX BYTEV+1
2310                 LDX #(string% MOD 256)
2320                 LDY #(string% DIV 256)
2330                 JSR CSCLI
2440                  RTS
2450 ]
2460 ENDPROC
2500 DEF PROC_DATA_BLOCKS
2510[ OPT opt% : .string% : ]
2530 $P% = filename$
2540 P% = P% + LEN(filename$)+ 1
2550 PROC_CHANNELS
2560 PROC_KEYS
2570 [ OPT opt%
2600     .REVEC      NOP
2610                 NOP
2620     .offset%    NOP
2630     .value%     NOP
2640     .tempA%     NOP
2650     .tempX%     NOP
2660     .tempY%     NOP
2670 ]
2680 ENDPROC
2700 DEF PROC_CHANNELS
2710 [ OPT opt% : .channel% : ]
2720 ?P%  = 0
2730P%?1 = 2
2740P%?2 = 2
2750P%?3 = 1
2760P%?4 = 1
2765 IF NOT both% THEN P% = P%+5 : ENDPROC
2770P%?5 = 0
2780P%?6 = 4
2790P%?7 = 4
2800P%?8 = 3
2810P%?9 = 3
2820 P% = P% + 10
2830 ENDPROC
2900 DEF PROC_KEYS
2910 [ OPT opt% : .data% : ]
2920?P% = fire_left%
2930P%?1 = up_left%
2940P%?2 = down_left%
2950P%?3 = left_left%
2960P%?4 = right_left%
2970IF NOT both% THEN P% = P%+5 : ENDPROC
2980P%?5 = fire_right%
2990P%?6 = down_right%
3000P%?7 = up_right%
3010P%?8 = right_right%
3020P%?9 = left_right%
3030P% = P% + 10
3040ENDPROC
3100DEF PROC_CONTROL
3110 PROC_CHECK_CODES
3120PROC_CHECK_VALUE
3130PROC_CHECK_STICKS
3140PROC_EXIT
3150ENDPROC
3200DEF PROC_CHECK_CODES
3210[ OPT opt%
3220     .main%          STA tempA%
3230                     STY tempY%
3240                     STX tempX%
3250                     PHA
3260                     TXA
3270                     PHA
3280                     TYA
3290                     PHA
3300                     PHP
3310                     LDA tempA%
3320                     CMP #&81
3330                     BNE continue%
3340                     LDA tempY%
3350                     CMP #&FF
3360                     BNE continue%
3370                     JMP lookup%
3380     .continue%       PLP
3390                     PLA
3400                     TAY
3410                     PLA
3420                     TAX
3430                     PLA
3440                     JMP (REVEC)
3450]
3460ENDPROC
3500DEF PROC_CHECK_VALUE
3510[ OPT opt%
3520     .lookup% : LDY #sticks%
3530     .loop_2%        LDA data%,Y
3540                     CMP tempX%
3550                     BEQ found%
3560                     DEY
3570                     BPL loop_2%
3580                     JMP continue%
3590]
3600ENDPROC
3670DEF PROC_CHECK_STICKS
3680[OPT opt%
3690     .found%          STY offset%
3700                      LDA #1
3710                      CPY #0
3720                      BEQ fire%
3730                      LDA #2
3740                      CPY #5
```

(listing continued on next page)

(continued from previous page)

a negative call and the X register containing one of the negative numbers we are interested in. If such a call is detected then the position of the particular position and state of the stick we are interested in is examined with Osbyte call &80.

If the test is positive then the X and Y registers are loaded with &FF indicating a successful call and a RTS is used to exit. If the joystick test is negative then the routine is allowed to continue upon its usual path in order to test the keyboard.

This is accomplished in the listing as follows. The program is divided into three main sections Prepare, Execute and Test. Prepare collects and processes the user input. Execute assembles the code and Test tests and files the code.

Proc-Prepare commences with Proc-Choices which inputs the preliminary information concerning the number of sticks, the assembly address and the filename to be chained. Proc-Inputs will accept data for each or one of the sticks. These are inputted as positive numbers; the program adding the negative element by using Proc-Complement and Fn-Complement to convert them into their eight bit binary twos complement representation.

Proc-Execute uses Proc-Setup to initialise some system variables, the only strange one of which is Bytev — byte vector which is the location in RAM which Osbyte calls pass through. Proc-Setup is the only part of the code which is actually executed when the file loads. It transfers the original vector to our location Revec — re-vector — and then inserts into that location the address of our main routine. It exits by calling Oscli to *Run the loader program.

This relies upon a data block being established by Proc-Data-Blocks. This is a cumbersome routine in Basic1 and can be simplified if you are fortunate enough to have Basic2. It stores the *Run Filename command needed above and establishes a mask table for reading the joysticks with Proc-Channels and a table of relevent numbers with Proc-Keys.

The code which actually performs the task is assembled by Proc-Control; which calls several subservient routines. The routine is entered at the label Main% where the contents of the registers are first dumped then stacked. The contents are then undumped in order to determine the precise Osbyte call.

Check-Value will test the contents of the X register against the values stored in the table. If a match is found then it continues with the routine contained within Check-Sticks else a continuation is made. Check-Sticks will use the offset within the table first to determine if the fire buttons are to be tested and divert to Fire% if so.

If the fire button is not indicated then the relevent channel number to be tested is loaded from the table and the value of that channel determined with an Osbyte call. When this returns the offset is used to decide if the top or bottom of the range has to be tested.

Proc-Test is included mainly for developmental purposes. Once you are satisfied the code is operating correctly then the saving routine can be entered by pressing Escape.

(listing continued from previous page)

```
3750                     BEQ fire%
3760                     LDX channel%,Y
3770                     LDA #&80
3780                     JSR OSBYTE
3790                     STY value%
3800                     LDA offset%
3810                      AND #01
3820                     BNE topvalue%
3830                     LDA value%
3840                     CLC
3850                     SBC #07
3860                     BCS continue%
3870                     JMP exit%
3880       .topvalue% :   LDA value%
3890                     AND #&C0
3900                     BPL continue%
3910                     JMP exit%
3920       .fire%        STA value%
3930                     LDX #0
3940                     LDA #&80
3950                     JSR OSBYTE
3960                     TXA
3970                     AND value%
3980                     BEQ continue%
3990]
4000ENDPROC
4100DEF PROC_EXIT
4110[OPT opt%
4120          .exit%      PLA
4130                      PLA
4140                      PLA
4150                      PLA
4160                      LDX #&FF
4170                      LDY #&FF
4180                      RTS
4190 ]
4195 ENDPROC
6000 DEF PROC_TEST
6010 ON ERROR PROC_SAVE
6020 CLS
6030 FOR N% = 0 TO 1
6040 PRINTTAB(8,N%)CHR$(141);"TESTING"
6050 NEXT
6060 PROC_TITLES
6070 PROC_REVECT
6075 TIME = 0 : REPEAT
6080 PROC_TESTING
6085 UNTIL FALSE
6090 ENDPROC
6100 DEF PROC_TITLES
6110 PRINTTAB(2,4)"LEFT_FIRE  "
6120PRINTTAB(2,6)"LEFT_UP    "
6130PRINTTAB(2,8)"LEFT_DOWN   "
6140PRINTTAB(2,10)"LEFT_LEFT   "
6150PRINTTAB(2,12)"LEFT_RIGHT  "
6155 PRINTTAB(2,24)"Press escape to save file.";
6160IF NOT both% THEN ENDPROC
6170PRINTTAB(2,14)"RIGHT_FIRE   "
6180PRINTTAB(2,16)"RIGHT UP     "
6190 PRINTTAB(2,18)"RIGHT_DOWN   "
6200PRINTTAB(2,20)"RIGHT_LEFT   "
6210PRINTTAB(2,22)"RIGHT_RIGHT  "
6220ENDPROC
6300 DEF PROC_TESTING
6310PROC_ONE_TEST(4,fire_left$)
6320PROC_ONE_TEST(6,up_left$)
6330PROC_ONE_TEST(8,down_left$)
6340PROC_ONE_TEST(10,left_left$)
6350PROC_ONE_TEST(12,right_left$)
6360IF NOT both% THEN ENDPROC
6370PROC_ONE_TEST(14,fire_right$)
6380PROC_ONE_TEST(16,up_right$)
6390PROC_ONE_TEST(18,down_right$)
6400PROC_ONE_TEST(20,left_right$)
6410PROC_ONE_TEST(22,right_right$)
6420ENDPROC
6430 ENDPROC
6500DEF PROC_ONE_TEST(pos%,string$)
6505 string$ = "-"+string$
6510PRINTTAB(15,pos%);
6520IF INKEY(VAL(string$)) THEN PRINT"*"; ELSE PRINT" ";
6530 ENDPROC
6600 DEF PROC_REVECT
6610 ?REVEC = ?BYTEV
6620 REVEC?1 = BYTEV?1
6630 ?BYTEV = main% MOD 256: BYTEV?1 = main% DIV 256
6640 ENDPROC
6700 DEF PROC_SAVE
6705 IF ERR<>17 THEN REPORT : PRINT"AT LINE",ERL
6710 CLS
6720 FOR N% = 0 TO 1
6730 PRINTTAB(8,N%)CHR$(141);"SAVING"
6740 NEXT
6750 PRINTTAB(2,4) "START ADDRESS      ";~address%
6760 PRINTTAB(2,6) "LENGTH             ";~P%-address%+1
6770 PRINTTAB(2,8) "EXECUTION ADDRESS ";~address%
6780 PRINTTAB(2,10)"OVERWRITE ADDRESS ";~REVEC
6790 PRINTTAB(2,12)"CRITICAL LENGTH   ";~P%-REVEC
6800 PRINTTAB(2,18)" ENTER *SAVE COMMAND"
6810 PRINTTAB(2,29)" USE BREAK TO RESET "
6820 END
10000 DEF FN_O_K
10001 PRINTTAB(8,20)"O.K. (Y/N) ";
10010 response% = GET AND 223
10020 IF response% <> 78 AND response% <> 89 THEN 10010
10030 IF response% = 78 THEN = FALSE ELSE = TRUE
10140 DEF FN_COMPLEMENT(string$)
10150 ON ERROR PROC_ERROR(1)
10160 code% = VAL(string$)
10170  = ((NOT code%) AND &000000FF) + 1
20000 IF INKEY(-101) THEN PRINT"B";
20010 IF INKEY(-83) THEN PRINT"C";
20020 ENDPROC
```

VISION STORE South London's Largest Specialist Micro Computer Centres Offer

INTEREST FREE CREDIT on Micro Computers and Peripherals

In addition to offering computers and peripherals at low, low prices, Vision Store now offer Interest Free Credit i.e. paying over 6 or 9 months with no interest charge. To take advantage of our Interest Free Credit Scheme come to one of our stores where our friendly staff will help you complete the form. Then subject to status, after paying the deposit, you can take the goods away with you. It's as simple as that!

COMPUTERS

COMMODORE

CBM 64 Business Package
including 1541 disk drive, 801 dot matrix printer and £205 worth of FREE software
£629.95
Interest Free
Deposit £77.95 + 6 monthly payments of £92.00



	Price	Deposit	Payments
CBM 64	£204.55	£24.95	6x£30.00
CBM 64 with C2N Cassette	£249.55	£33.95	6x£36.00
CBM 1541 Disk Drive	£219.95	£27.95	6x£32.00
MPS 801 Dot Matrix Printer	£225.55	£30.95	6x£32.50
MPS 302 Letter quality dot printer	£339.55	£39.95	6x£50.00
CBM 1701 Colour Monitor	£229.95	£31.95	6x£33.00

SX64 Portable Computer including Disk Drive and Colour Monitor plus £210 of FREE Software
£799.95
Interest Free
Deposit £205.59 + 6 monthly payments of £99.00



	Price	Deposit	Payments
NEW C16 Starter pack inc. Cassette recorder and Software	£129.90	£30.90	6x£16.50
Plus 4 64K Computer inc. Software	£219.90	£33.90	6x£36.00

ATARI

Atari 800XL 64K computer
£199.90
Interest Free
Deposit £19.90 + 6 monthly payments of £30.00



	Price	Deposit	Payments
600XL with 1010 Cassette Deck	£135.90	£36.90	6x£16.50
1050 disk drive	£199.90	£19.90	6x£30.00
1027 Letter quality printer	£199.90	£19.90	6x£30.00

Phone for new low prices on other Atari products.

Interest Free Credit available to Mail Order Customers. Phone or write for details.

News Flash Just Available ...
Tinted hard perspex cover for BBC and Commodore computers. Beautifully finished in smoked amber colour. Extremely practical.

BBC MODEL B	**£17.95**
CBM64 and VIC-20	**£14.95**

Prices include Postage and Packing.
Trade Enquiries Welcome.

BBC

BBC Model B
£399.95
Interest Free
Deposit £99.95 + 6 monthly payments of £50.00



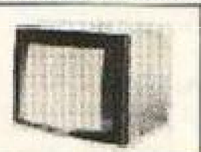
	Price	Deposit	Payments
BBC B inc. cassette deck and cables	£439.95	£49.95	6x£65.00
BBC B with Disk I/F plus 100K Cumana Disk Drive	£689.95	£95.95	6x£99.00

Cumana CSX100 Disk Drive
£185.95
Interest Free
Deposit £29.95 + 6 monthly payments of £26.00



	Price	Deposit	Payments
CUMANA 1x200K Disk Drive CSX200	£229.95	£37.95	6x£32.00
CUMANA 2x100K Disk Drive CD200	£359.95	£47.95	6x£52.00
CUMANA 40/80TR 2x200K CD400	£539.95	£71.95	6x£78.00
CUMANA 40/80TR 2x400K CD800	£579.95	£99.95	6x£80.00

Microvitec Cub RGB Colour Monitor
£229.95
Interest Free
Deposit £44.95 + 6 monthly payments of £30.00



	Price	Deposit	Payments
SANYO 14" RGB Monitor Std	£249.95	£33.95	6x£36.00
1451DQ Black for Sinclair QL	£279.90	£39.90	6x£40.00
1431MZ Black for ZX Spectrum	£259.90	£37.90	6x£37.00

PRINTERS

DOT MATRIX

Epson RX80
Dot Matrix Printer
£259.95
Interest Free
Deposit £37.95 + 6 monthly payments of £37.00



	Price	Deposit	Payments
EPSON RX80 F/T	£299.95	£59.95	6x£40.00
EPSON FX80	£439.95	£49.95	6x£65.00
EPSON MX100 F/T	£489.95	£57.95	6x£72.00
EPSON FX100 F/T	£579.95	£63.95	6x£86.00
SEIKOSHA GP100A	£179.95	£23.95	6x£26.00
SEIKOSHA GP500A	£179.95	£23.95	6x£26.00
SEIKOSHA GP550A	£229.95	£37.95	6x£32.00
SEIKOSHA GP700A	£349.95	£49.95	6x£50.00
SHINWA CP80	£279.95	£39.95	6x£40.00
STAR DP515	£319.95	£43.95	6x£46.00
STAR GEMINI 10X	£299.95	£35.95	6x£44.00
Brother EP44	£239.95	£35.95	6x£34.00

DAISY WHEEL LETTER QUALITY

Smith-Corona TPI
Daisy Wheel Printer
£259.95
Interest Free
Deposit £37.95 + 6 monthly payments of £37.00



	Price	Deposit	Payments
JUKI 6100	£439.95	£49.95	6x£65.00
BROTHER HR15	£455.95	£53.95	6x£67.00

Memotech MTX500 32K
£199.95 Interest Free Deposit £19.95 + 6 monthly payments of £30.00

Memotech MTX512 64K
£279.95 Interest Free Deposit £39.95 + 6 monthly payments of £40.00

New Additions — Just In

Sanyo MBC 555
16 bit business computer
128K RAM
Twin 160K Disk Drives
Detachable Keyboard
With the following FREE Software: —
MS-DOS — operating system
Wordstar — Word Processor
Calcstar — Spreadsheet
Infostar — Database
Spellstar — Spelling Checker
Worth £1,400 FREE
Interest Free Deposit £340 + 9 monthly payments of £90.00
£1,150 inc VAT
(please note Monitor is extra)

Cash Sales Only

Sinclair Spectrum 48K inc. Free games 6-pack worth £56.70	**£125.95**
Sinclair Interface 1 and Micro Drive inc. 5 Free programs	**£97.95**
Amstrad Computer inc. cassette + green screen monitor	**£229.95**
Amstrad Computer inc. cassette + colour RGB monitor	**£329.95**
Acorn Electron	**£199.95**
Brother HR5 Printer	**£159.95**

SOFTWARE

Dont forget —
We are London's largest stockist of Micro Computer Software. Over 1,000 programmes in stock for games, educational and business. Continuous demonstrations.

EXPORT

All our hardware and software is available Tax-Free to overseas customers, please send for our comprehensive list. Please contact our Croydon office.

MAIL ORDER

We send our whole range anywhere in the UK by FREE Insured Securicor Delivery. Please contact our Croydon office.

We supply PLC's, Government departments and Educational establishments.

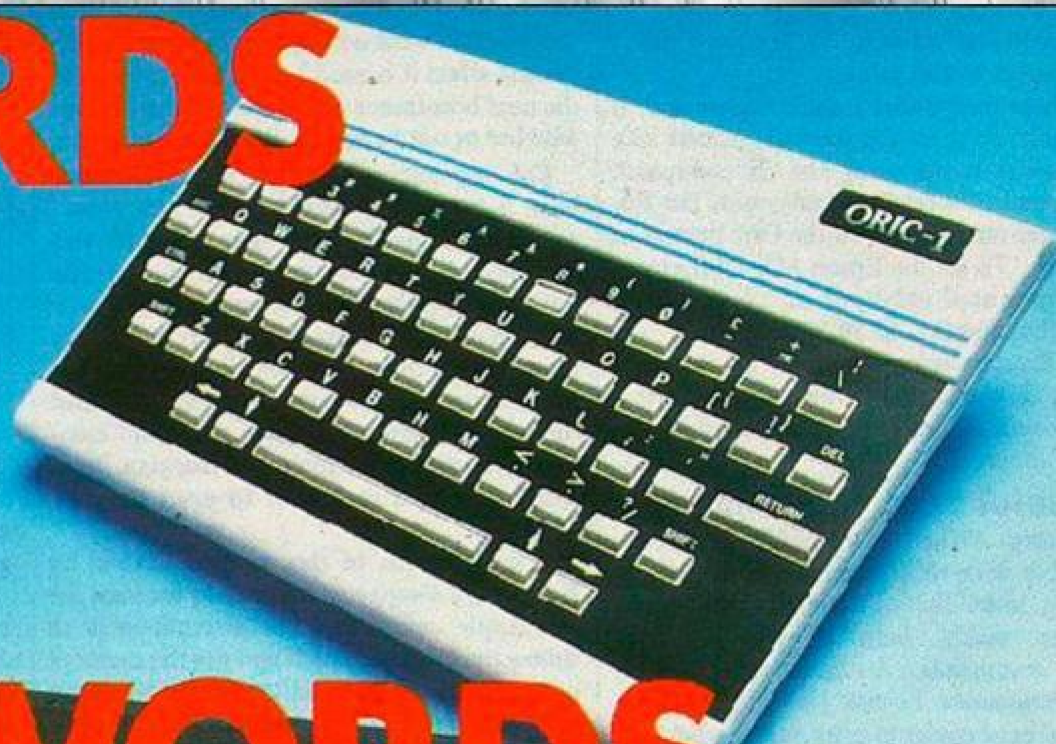
VISION STORE

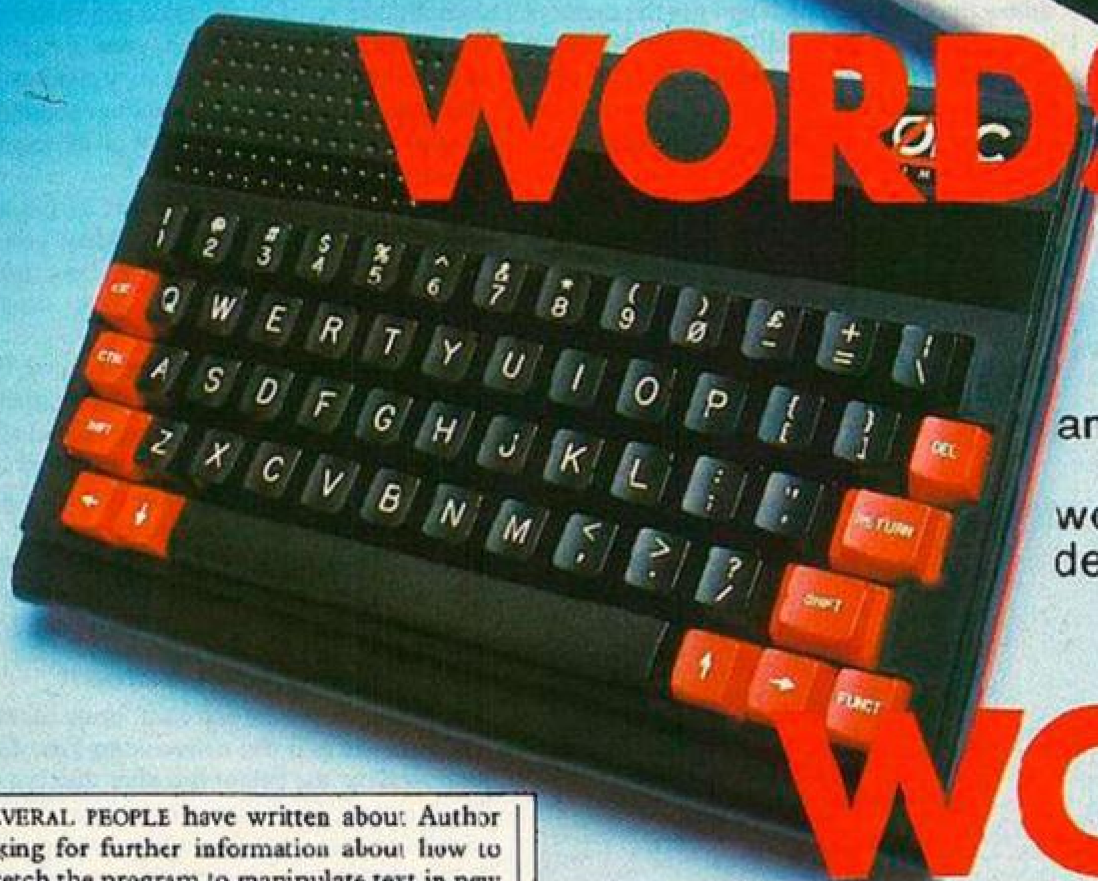
All Prices Include VAT

VISIONSTORE KINGSTON
3 Eden Walk Precinct, Kingston,
Surrey. Tel: 01-546 8974

VISIONSTORE CROYDON
96-98 North End, Croydon,
Surrey. Tel: 01-681 7539

WORDS WORDS WORDS





John Dawson takes on the tough job of coolly and impartially assessing the success of his own word processing program designed for the Oric and Atmos computers.

SEVERAL PEOPLE have written about Author asking for further information about how to stretch the program to manipulate text in new ways, and, on three occasions, reporting what appeared to them to be faults. In one case I was able to refer the writer to the Instruction Manual, in the second, the answer lies within the Oric operating system and in the third there is, I confess, a bug in the program.

In some conditions, the "dot" command to indent text produces unpredictable results and this will need to be corrected in the next version of the program.

So, what next? Software is evolving all the time and if Author is to continue as the Oric Atmos' best selling word processor it, too, will have to develop and grow.

Let's look at WordStar which has sold probably more copies than any other significant word processing program. WordStar costs about £300 unless you are fortunate enough to acquire a copy as part of the "bundled" software given away with some makes of computer. Despite its huge success WordStar is not a friendly or easy program to use.

Some important facilities are absent and others are difficult to use. For example, WordStar cannot count the number of words in a text, requires an additional program — Mailmerge — before it can insert names and addresses from a list into a series of letters and even then cannot select some of the names from the list according to criteria that you determine.

To be sure there are 18 different cursor movement commands in Wordstar and 17 commands to format the text on the VDU; but you cannot recover material that you have deleted if you made a mistake and after inserting or deleting material you must reform the paragraph with a separate command.

WordStar saves backup copies automatically on the floppy disc but there are times when three copies of the text are in existence and you tend to get warning messages as a long document approaches one third of the disc's normal capacity.

To some extent these are carping criticisms as I have written many articles and a couple of books using WordStar and the program's failings either do not affect me or can be overcome. The point is that even a commercially successful program can often be improved.

At present, Author has the following facilities:

From the Main Command Level it is possible to Write a new text, Edit an existing text, Continue writing an existing text, Store a text on to tape, Retrieve a text from tape, Append a text on tape to a text in the computer and Print a text from the computer memory. Additionally, you can change the tape speed, count the number of words in a text and change the printer installation codes.

In the Edit section of the program you can insert, overwrite, delete, move or copy text; kill the remainder of the text, recover deleted material, print from the cursor position, find a text marker, find and change words or phrases, and automatically insert material at predetermined positions in the text. It is possible to write a block of text to tape and then retrieve it later on, inserting it at the position of the cursor.

The printer installation, combined with the "dot" X (.X) command, is very flexible. Up to seven characters, which may be control characters, can be sent at the start of the text, the start of each page, the end of each line, the end of each paragraph, the end of each page and the end of the text.

There are five additional printer macro commands and the "dot" X command allows

(continued on next page)

(continued from previous page)
you to send a string of up to 30 control codes or characters to the printer.

For some reason that I don't understand, it is not possible to switch the Oric printer into the graphics mode using the .X command. The command works perfectly with the Epson printer range and with the Oric printer in text mode. To set the Epson MX-80 horizontal tabs you need only type in:

(Escape)D.X 10 20 35 45 60 0:

The Escape code is entered by typing a Control C, which makes the next character a Control code, followed by a left hand square bracket character.

19 useful "dot" commands

Author's "dot" commands compare favourably with those available in WordStar. While it lacks the conditional page break, character width, bidirectional print and footing commands, Author has 19 useful "dot" commands including one that will set the number of copies to print and another that can be used to number paragraphs or diagrams.

The areas in which Author can be developed seem to be the file handling — the Oric Atmos has micro-floppy discs as well as the ordinary cassette tape systems — and the editing facilities. Some improvements are very small things; the find and change command, for example, works from the beginning of the text and will replace ever string that matches the original word or phrase.

That has never been a problem in the work I have done and nobody has complained since the program went on sale but there may be occasions when it is useful to be able to look for the next occurrence of a word and then decide whether or not to replace it with the new one.

The new micro-floppy discs for the Atmos offer a range of possibilities. A new "dot" command is needed (.Z) that will link one document in memory to another on the disc for printing purposes. The action of the command will be to identify the next text to be printed from the name following the .Z, clear the text area of the computer memory, load the new text without altering the "dot" commands currently in force for margins, page length etc., and then start to print the new text.

A modification of this method is used by Format 80, a sophisticated word processor for the Apple computer. The alternative is to follow the WordStar path and use the memory of the computer as a window which will slide over the text held on the disc. As the computer memory fills up, the earlier part of the document is saved on to the disc to make room for new material.

This is a clever method of handling a document that is larger than the computer's memory but it is less relevant than it was in the early days of microcomputers because the RAM available to the user has grown enormously. Author leaves more than 28000 characters free in the Oric Atmos which is about 4600 words of ordinary text.

Other worthwhile developments seem to lie



in the construction of new, higher level editing commands that will make the preparation and formatting of text faster and easier.

Applewriter, for example, has a glossary command that allows you to set up a long and complicated word or sentence and then insert it into the text whenever you press a sequence of three keys. Each glossary entry can be up to 128 characters long and it may be inserted into your text by typing Control G followed by the identifying letter.

I'm not sure that this is easier to use than typing a special code like :ws when you are writing and then replacing all the ':ws' groups with WordStar when you have finished typing.

Any word processor being written in 1984 should include a telecommunications capability. This means that the program should allow you to chat with a remote computer and then transmit and receive texts that you have written or want to do some further work on. WordStar is particularly weak as the program sets one or other of the spare high bits in some characters to mark their position in the text.

Uses 40 column screen

Figure 1 shows the text that forms the start of this article as it was delivered to *Your Computer* — what the Editor did after that is a different matter. Figure 2 is a hexadecimal dump of the same text as it is held on a floppy disc. Return characters entered by the writer are stored as OD Hex. while those put into the text by the program are stored as 8D Hex. (00F0, 0133, 015F etc.).

The last character of each word is also distinguished by having the 'high' bit set — look for the characters preceding a 20 Hex. — space — character. The trouble with this system is that some electronic mail boxes strip off information other than the basic seven bit ASCII character set.

Consequently, a WordStar text stored in a mainframe electronic mailbox is returned with all the soft return characters at the end of each line converted into hard returns which cannot be handled properly by the program.

Author uses the 40 column screen on the Oric for entering text and the loss of memory that would be necessary to create an 80 column screen using the high resolution mode doesn't seem to justify the gain in presentation. One exception to this is the preparation of tables where WordStar's ability to show you on screen what will be printed is valuable.

The other reason for using a high resolution display on the Atmos computer might be to generate some fashionable icons in some parts

(continued on page 158)

Figure 1. Sample text.

```
TYPE B:YCAUG
.pl 44
.mb 3
.mt 2
.po 16
.pn 1
.op

.heJohn Dawson                                    #
               WORDS FOR WORD PROCESSING

                    by John Dawson

          for Your Computer - August 1984

AUTHOR, the word processor that I wrote for the
Oric 1 and Oric Atmos computers is selling well.
After fourteen months work converting and
improving the program that I had written for the
Tangerine Microtan computer, it's good to be
getting some royalties.  You won't get rich
quickly writing 'serious' software like word
processors, spreadsheet calculators, machine
code or BASIC utility programs, but there may be
a steady income for some time until the market
saturates, a better program appears or the
machine on which the program runs goes out of
production.

Testing a new piece of software is always

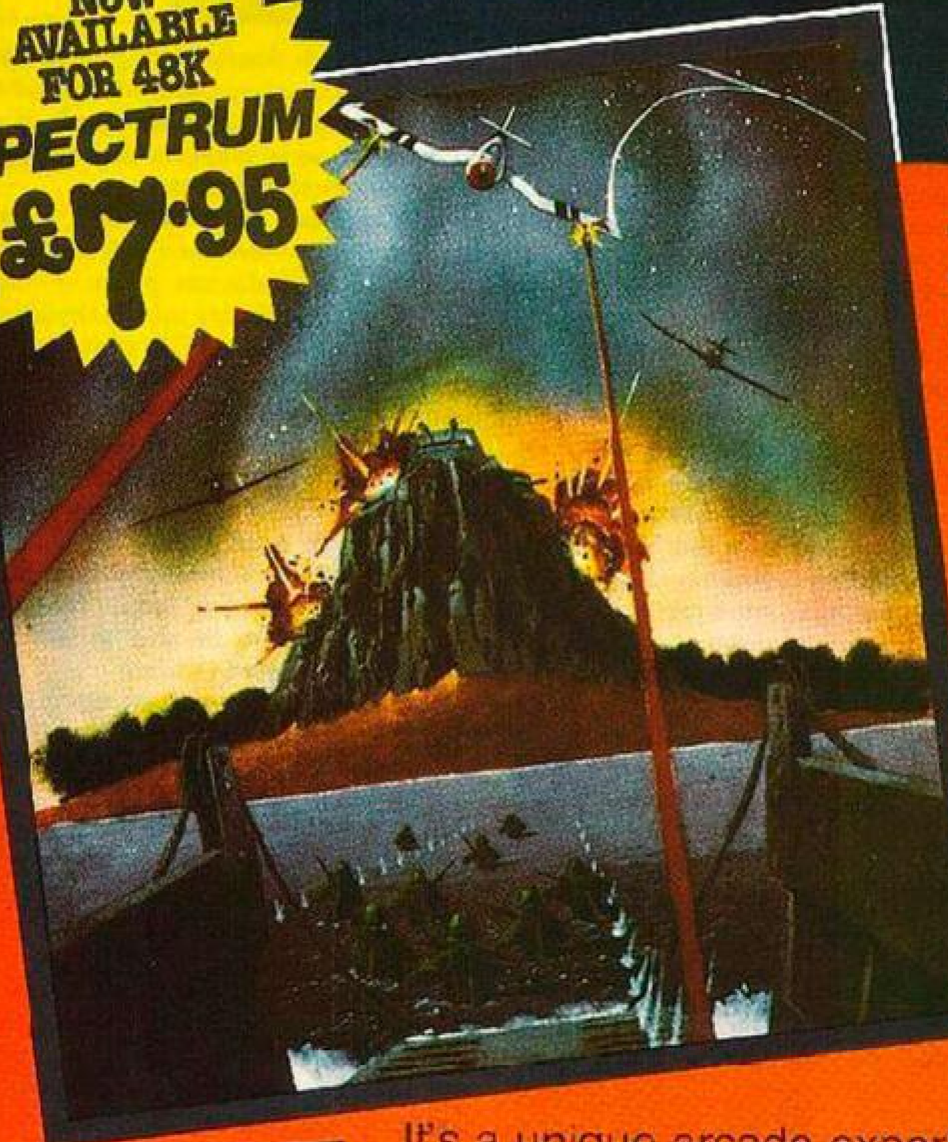
A>
```

One of America's most popular games

THE ULTIMATE IN BATTLE ACTION...

BEACH-HEAD™

NOW AVAILABLE FOR 48K SPECTRUM £7·95







Incredible 3-D Graphics

Unbelievable Sound Effects

Unique Games Concept

Multiple Screens

High Resolution Scenario

TOP FIFTY

This week	Last week	Weeks in chart	Title/Publisher
1	10	2	Beachead Access/US Gold
2	35	2	Mugsy Melbourne House
3			Sabre Wulf Ultimate
4	2	5	Psytron Beyond

Voted by U.S. Billboard magazine as the best game for sound and graphics on the Commodore 64

It's a unique arcade experience in sound and vision and a stunning display of Commodore 64 capabilities.

Another quality product from ***ACCESS*** Software.



Available on CASSETTE £9·95 DISK £12·95



THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD

U.S. Gold is stocked by all leading computer stores including:



WHSMITH

DEALERS! For information on how to become a U.S. Gold Stockist write to: Centresoft Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH. Telephone: 021-520 7591.
Overseas enquiries welcome.

U.S. GOLD

All American Software

(continued from page 156)

of the program. Although I have redefined two characters in Author to display Return (OD Hex.) characters and the "dot" of the "dot" commands both of these are comparitively abstract representations of what they portray.

Icons are now used in many programs to represent a function that can be carried out by pressing a single key. Scissors and a paste pot are used to indicate the cut and paste functions in American word processors.

The trouble is that icons are heavily culture-dependent and if you don't think of moving text in terms of cutting and pasting then the pictures are likely to be positively confusing. What, for example, would you make of a small picture of a camera at one place in a word processor program?

Icons are useful

The function performed by pressing the camera button is to take a snapshot of a marked section of text. A "snapshot" actually means that the text is removed from the main document and stored elsewhere in the computer's memory. Move ... To — the two equivalent Author commands — have always seemed ergonomically straightforward and easy to use.

I think icons are useful where they are designed by a professional graphics artist who understands the expectations of the limited group of users who will operate the program. Outside those constraints icons are likely to add little to the performance of a piece of software while making heavy demands on an 8 bit computer's central processor unit.

In any case, icons are likely to be an evolutionary sideshoot; in time they will be overtaken by direct voice input for many programs, being retained in software written for children, visually handicapped people and aging, computer illiterate executives.

Software is gradually becoming more integrated which means that once information has been put into the computer it can be manipulated by several programs. The Incredible Jack program for the Apple computer allows you to write a letter using the word processor part of the system and then total a number of figures that you have typed into the letter.

If you use the mailmerge part of the program to insert figures that relate to each customer, it is possible to produce personal letters that have computed totals.

For example if you are writing to each of the sales representatives in your area at the end of the month to tell them how much commission they have earned, the Incredible Jack will take the sales figures from one file, incorporate them into a standard letter, work out the commission and automatically insert that figure into the letter.

Word processing commands are important also in entering and extracting information from full text databases. Conversely, the power of a word processor can be increased greatly by including commands that will sort structured information into a particular order, or that will search through a collection of information, displaying records that relate to the search data.

If you type in information about yourself



you may include details about your insurance policies, your employer, your friends and relations, the people who have done work on your house or flat, serial numbers of cameras, hi-fi units, computers and so on.

Each insurance policy will have a record and within each record there will be a number of fields or small discrete pieces of information. The first field may contain the information that this record is to do with Insurance, the second the name of the company and the third the date when the premium is payable.

Another record may have the word People in the first field to mark it as being to do with your friends, relations and contacts who have worked on your house in the past. A database of this sort is very loosely structured and quickly becomes quite large. It may be valuable for you to be able to search the database for the word October.

From this search you might expect to find records of friends with birthdays in October, insurance policies with premiums that that are payable in October, or the expiry date of a guarantee for repairs to your lawn mower. If the program permits you to add a second search term and a logical operator to link the two, it becomes a very powerful method of accessing information.

So, a search for "July AND People" or "Builder OR PLumber" will narrow or extend the results produced by the program.

Structuring information using enhanced word processor commands is quite easy to do and the second version of Author will include the necessary software. The easiest and most effective way to sort information into alphabetical or numeric order seems to be by indexing the records in the file of data according to sort criteria entered by the user.

If you decide that you want the records sorted on the first field so that all the Insurance records come before the People records, it should be possible to set up a list of two byte addresses which point to the first character in each record.

It is then comparatively easy and very fast to examine the first field in each record and exchange the fixed length two byte addresses depending on the comparison of the first field of one record with the first field of the next.

It is unlikely that a single programmer can hope to emulate the teams of people working on software like Lotus 1-2-3, but by careful analysis it should be possible to develop Author to offer some more sophisticated functions which will apply to many of the text handling tasks people want to carry out. I guess that another version of Author will take about six months to produce. ■

Figure 2. Hex dump.

```
0000 2E 70 EC 20 34 34 0D 0A 2E 6D E2 20 33 0D 0A 2E
0010 6D F4 20 32 0D 0A 2E 70 EF 20 31 36 0D 0A 2E 70
0020 EE 20 31 0D 0A 2E 6F 70 0D 0A 17 12 0D 0A 2E 68
0030 65 4A 6F 68 EE 20 44 61 77 73 6F EE 20 20 20 20
0040 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
0050 20 20 20 20 20 20 23 0D 0A 20 20 20 20 20 20 20
0060 20 20 20 20 57 4F 52 44 53 20 46 4F 52 20 57 4F
0070 52 44 20 50 52 4F 43 45 53 53 49 4E 47 0D 0A 0D
0080 0A 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
0090 20 20 62 79 20 4A 6F 68 6E 20 44 61 77 73 6F 6E
00A0 0D 0A 0D 0A 20 20 20 20 20 20 20 20 66 6F 72 20
00B0 59 6F 75 72 20 43 6F 6D 70 75 74 65 72 20 2D 20
00C0 41 75 67 75 73 74 20 31 39 38 34 0D 0A 0D 0A 41
00D0 55 54 48 4F 52 AC 20 74 68 E5 20 77 6F 72 E4 20
00E0 70 72 6F 63 65 73 73 6F F2 20 74 68 61 F4 20 C9
00F0 20 77 72 6F 74 E5 20 66 6F F2 20 74 68 E5 20 8D
0100 0A 4F 72 69 E3 20 B1 20 61 6E E4 20 4F 72 69 E3
0110 20 41 74 6D 6F F3 20 63 6F 6D 70 75 74 65 72 F3
0120 20 69 F3 20 73 65 6C 6C 69 6E E7 20 77 65 6C 6C
0130 AE 20 20 8D 0A 41 66 74 65 F2 20 66 6F 75 72 74
0140 65 65 EE 20 6D 6F 6E 74 68 F3 20 77 6F 72 EB 20
0150 63 6F 6E 76 65 72 74 69 6E E7 20 61 6E E4 20 8D
0160 0A 69 6D 70 72 6F 76 69 6E E7 20 74 68 E5 20 70
0170 72 6F 67 72 61 ED 20 74 68 61 F4 20 C9 20 68 61
0180 E4 20 77 72 69 74 74 65 EE 20 66 6F F2 20 74 68
0190 E5 20 8D 0A 54 61 6E 67 65 72 69 6E E5 20 4D 69
01A0 63 72 6F 74 61 EE 20 63 6F 6D 70 75 74 65 72 AC
01B0 20 69 74 27 F3 20 67 6F 6F E4 20 74 EF 20 62 E5
01C0 20 8D 0A 67 65 74 74 69 6E E7 20 73 6F 6D E5 20
01D0 72 6F 79 61 6C 74 69 65 73 AE 20 20 59 6F F5 20
01E0 77 6F 6E 27 F4 20 67 65 F4 20 72 69 63 E8 20 8D

A>^C
```

NOT FOR PEOPLE WITH HIGH BLOOD PRESSURE!

Watch out for them—these four new games could be dangerous to your health. And, as they're from A'n'F, they're second to none, calling for a level of skill that's bound to set the adrenalin racing.



SPECTRUM 48k CYLON ATTACK—Now with better than ever isometric perspective graphics (3D). **£5.75**

BBC 32k SNARL-UP—Sheer bumper to bumper frustration and only five chances to hit the fast lane. **£6.90**

COMMODORE 64 GUMSHOE—One bleepin' obstacle after another stops you reaching a girl who needs you—desperately. **£7.90**

SPECTRUM 48k ALPHA-BETH—The brain teaser that makes it doubly difficult for you to give the right answer. **£5.75**



A&F Software, Unit 8, Canal Side Industrial Estate, Woodbine Street East, Rochdale, Lancs OL16 5LB. Telephone: 0706 341111

RESPONSE FRAME

Do you have a problem? Your manual is incomprehensible or you just cannot get the hang of that programming trick you tried — whatever it is, Tim Hartnell will do his best to answer your queries. Please include only one question per letter and mark them "Response Frame".

LOADING TROUBLE

I have owned a Commodore 64 for quite a few months and use Commodore's 2CN cassette unit for storing and retrieving my own programs without any difficulty. Recently, however, I decided to purchase a number of prerecorded games programs:

Crazy Kong, by Interceptor Micros-States.

Falcon Patrol by Virgin Games.

Neoclyps by Personal Software Services.

Out of the three programs, only the first one will load and run. On the other occasions the computer states it is searching but never locates the program. I have always followed the standard instructions when loading — or trying to load — the programs. Is there a good reason for my programs failing to load, or have I just been unlucky?

G F Chandler,
Hyde,
Cheshire.

DIRTY CASSETTE heads should always be considered the first culprit when having problems loading tapes from another source. The second thing to look at is how the various leads joining things together overlap. It is best if you can make sure the lead joining the cassette unit to the computer is not tangled up with the power supply lead or the video lead to the television.

If these measures do not work, and you bought the software from a shop, I suggest you return it to that store, and ask to see a replacement copy actually loading before you will accept it.

If you bought by mail, I suggest returning the faulty cassettes, explaining the problem, and asking for replacements. I rang Virgin Games on this — I was unable to get an answer on the number I obtained for Personal Software Services — and was told that questions of this type were extremely rare. However, Virgin said they would replace any such cassettes with another of the same title without question if it was returned in good condition.

TO BUY OR NOT

I would appreciate your advice on whether to purchase a new home computer or not. I own a 48K Spectrum which I have had for a year now. The problem I am faced with is whether or not to expand my Spectrum interfaces and joysticks and the like or to sell it before the prices drop again and buy a more advanced computer like Enterprise. Help!

Jonathan Maund,
Gill: Green,
Hawkhurst.

IT ALL DEPENDS on how much you've invested in software and how easily you think you will adapt to working with a new version of Basic. There is a lot to be said for both sides of the coin. A new Basic and a more advanced machine will possibly allow you to widen your programming skills, although if you have a good software library you'll have to consider whether or not you wish to start all over again.

Note that second-hand computers do not sell for very much and selling "before the price drops again" — which it probably won't do in the forseeable future — is not going to be particularly profitable. I would not suggest you rush into a decision if you're reasonably happy with your current machine.

When the bugs are ironed out of the QL and supplies are available you might consider buying one of those. At least, you can then program initially in "Spectrum Basic" before trying out some of the new SuperBasic commands. The BBC Micro and the Amstrad are also worth consideration. As for the Enterprise, we'll believe it when we see it. A computer in the shops is worth 50 which are "coming soon".

BASIC DATA

I require some rather basic information. I am about to purchase a computer. It must fulfil the following criteria:

1. Be capable of handling Cobol, Pascal, Fortran, Basic and CP/M.

2. An 80 column screen.

3. The computer, without discs, should be no more than £500.

Please inform me which computers will fulfil my requirements.

Finally, do you have any idea how much these compilers and operating systems cost for the above languages?

C Baylis,
Upton,
Wirral.

I DON'T THINK a computer such as you describe exists, although the BBC Model B, when fitted with the second processor — Z-80 — comes very close.

The computer will cost you around £400, while the second processor is around £300. With the Z-80 you get a number of programs, including a standard implementation of Cobol (CIS-Cobol), CP/M 2.2 with GSX graphics capability, Z 80 BBC Basic and Mallard Professional Basic. You can read standard CP/M discs, so you should have no trouble locating the other packages you want. To give you an idea of costs, Pascal, operating under CP/M-86 for the IBM PC, is £290, and Supersoft Fortran — also CP/M 86 — is £283.

VARIABLE PROBLEM

I own a ZX Spectrum and while writing a short program concerned with defining the user-definable graphics, I discovered a problem of converting binary numbers into decimal ones using the BIN statement. Although the computer will convert binary numbers entered directly, as in

```
PRINT BIN 10011001
```

it refuses to convert variables, as in

```
LET A = 10011001 PRINT BIN A
```

Could you please tell me how to overcome this problem?

Antony Rowland,
Tarpeley,
Cheshire.

VARIABLES CAN only be assigned to decimal numbers. They are not designed to accept a number like 10011001 and understand that it means anything other than "ten million, eleven thousand and one". To get around this, you need to have your binary number entered as a string, and then have this string cut into slices which can be converted into a decimal number. You do not use the BIN statement in this routine.

COPYRIGHTED?

I have written a program in which I have used some machine-code routines from magazines and books. Is it forbidden to publish it because other people have some sort of copyright?

Marcel Houweling,
Huybergen,
Holland.

IF YOU HAVE any doubts as to the originality of your program do not try to get it published. You do not specify how much of your program comes from other sources. If you have simply taken, say, a sort routine — which is pretty standard anyway — I would say there is no danger of infringing someone's copyright.

All of us borrow such things as good Pokes, clever ways of reading the keyboard or of manipulating strings and the like. There is little danger of copyright infringement here if the borrowed part is just part of a line, or is more a technique than a piece of actual code you are taking. It sounds to me from your letter as though you have taken more than just a good Poke so you should probably not try to have your program published.

ORIC TO ATMOS?

I own an Oric and have taught myself to program on it. I have also bought a great deal of software for it. I am now considering upgrading to a new computer and am considering the Atmos. Is the Atmos significantly different from the Oric, or is it basically the same machine with a new case and keyboard?

Neville Davison,
Stourbridge.

THERE IS NO doubt that the Atmos is a considerable improvement on the Oric. Some bugs in the original ROM have been removed, the Basic has been modified and the Atmos keyboard is much better than the Oric one. You will be able to program the Atmos in almost the same way as you did the Oric although there are a few new commands — such as Store and Recall — and Plot works slightly differently.

Despite claims that software written for the Oric-1 will work on the Atmos, my experience suggests that this is true for less than half the software currently on the market.

SHOULD I UPGRADE?

Having owned a Spectrum for eight months, I now feel I would like to upgrade my current machine and purchase a more professional computer. The two I have in mind are the Commodore 64 and the Electron. Each have their strong points but I am unable to make a decision as to which would benefit me the most. I would like your views on my situation.

N Gray,
Portsmouth.

I SUGGEST YOU make a list of the things you want to do with your computer and then see which of the two on your shortlist will supply these needs best. It might be worth remembering that Commodore's attention in the coming months will be increasingly on the new machines, especially the Plus 4, and although this does not mean the death of the Commodore 64 is near, the new machines must inevitably crowd out the older models.

The Electron is still a machine on the upward swing with more and more software and peripherals being released for it each week.

SPECTRUM PICTURE

I have had a 48K Spectrum for several months now and I am generally very pleased with it. However, I am not happy with the picture I get when it is plugged into our colour television.

Mark Ellingham,
Peterborough.

MUCH OF THE LACK of satisfactory picture quality is caused by radiation from the Spectrum which interferes with the intermediate frequency amplifier of the television. All you need to do is solder a phono socket to the left hand end of the TV modulator, and connect it in parallel with the video input to the modulator.

The outer connection goes to the modulator's metal case and the inner one to the video input. You should keep the lead between the monitor and the Spectrum as short as possible.

COMCON

Programmable Joystick Interface for the Spectrum

£19.95

inc VAT and P&P





Simple and fast programming: Plug the six function connectors into the required Spectrum key positions – Ready!

Two independent fire actions: Photon Blasters and Neutron Bombs at the touch of your fingertips

Extension port for Currah Microspeech unit. Combine joystick with sound and speech for ultimate arcade action.

Compatible with all Atari type joysticks including Quickshot II (without rapid fire action)

Interface operates joystick parallel to keyboard. Joystick action compatible with any add-ons including Microdrives.

QUICKSHOT 2+2 JOYSTICK

modified to incorporate 2 independent fire actions and no rapid fire option

£13.95 incl. VAT and P & P

FLIGHTLINK JOYSTICK

with 2 independent fire actions

£10.50 incl. VAT and P & P

CURRAH μSPEECH UNIT

fits into COMCON extension slot

£29.95 incl. VAT and P & P

Dealer Enquiries Welcome
Phone Ludlow (0584) 4894

ALSO AVAILABLE FROM SELECTED RETAIL OUTLETS

Send to

FREL LTD.

Hockeys Mill, Temeside, Ludlow, Shropshire SY8 1PD

Mr/Mrs/Miss ______

Address ______

______ Postcode ______

Qty	Code	Item	Item Price	Total £
	01	Comcon Interface	@ £19.95	
	02	Flightlink Joystick	@ £10.50	
	03	Quickshot 2+2 Joystick	@ £13.95	
	04	Comcon + Quickshot 2+2	@ £31.90	
	05	Comcon + Flightlink	@ £28.45	
	06	Currah μSpeech unit	@ £29.95	

I enclose a cheque/postal order made payable to FREL LTD for £

COMCON



An end to monitor madness and glare fatigue.

An Easy-Eye anti-glare screen is the answer to those frustrating headaches and eyestrains.

Measuring approximately 12"x9" it adheres to your TV screen or monitor to cut right through annoying glare.

You'll be able to improve on existing high-scores and program in comfort for hours!

Please send me ______ **E.Z.I.** screens at £3.50.

I enclose cheque/PO to the sum of £ ______

made payable to TRT Design.

Name ______

Address ______

Postcode ______

TRT Design, 216 Sussex Gardens, London W2

★ NOW AVAILABLE FOR THE AMSTRAD CPC 464!!

WIN THE POOLS?

SPECTADRAW 3 – THE LATEST VERSION OF THE ORIGINAL AND BEST POOLS PREDICTION PROGRAM FOR THE 48K ZX SPECTRUM!!

AND NOW . . . AMSTRA-DRAW – THE FIRST POOLS PREDICTION PROGRAM FOR THE AMAZING NEW AMSTRAD CPC 464!!



- Supplied with Database containing data on over 10,000 matches since 1980!
- You update the Database each week – but no tedious typing, as team and division names already in program!
- Errors easily corrected – the program even checks your entries!
- Comprehensive instruction manual and menu driven program – easy to use, even for a newcomer to computing!
- Will forecast the least likely draws for those who prefer to bet on fixed odds!
- Built in perm generator – complete your coupon direct from the screen!
- Fully microdrive compatible! (Spectadraw only).
- Compatible with Currah Microspeech – the first pools program to read you its predictions! (Spectadraw only).

Spectadraw 3 for the 48K Spectrum .... £9.95 inclusive
Amstra-Draw for the Amstrad CPC 464 .... £9.95 inclusive
(Cheques/PO's payable to B. S. McALLEY)

We dispatch every Monday with the database made up to include all matches up to the date of dispatch.

SPECTADRAW (Dept YC), 1 Cowleaze, Chinnor, Oxford OX9 4TD. (Tel: 0844-52426)

Software File gives you the opportunity to have your programs, ideas and discoveries published. We will accept contributions for any home computer provided they are submitted to *Your Computer* exclusively. Please double-check your programs and specify the memory they require before sending them, preferably on cassette. We pay between £6 and £36 for contributions published.

Priest and vampire

Adam Murray,
Regt Wksp,
REME BFPO20.



This is a game that was originally written in Basic on the BBC Micro. On the Spectrum it was found that Basic was too slow, so it has been translated into machine code.

The object of the game is for the priest to bless all the graves or destroy the vampire, and for the vampire to curse all the graves or destroy the priest. The priest can only function during the day, and the vampire can only function at night. The daytime is indicated by a cyan sky and the nighttime by a dark blue sky.

Table 1. The keys.

Priest	
P = up	
L = down	
B = left	
N = right	
Symbol shift = bless	
Vampire	
Q = up	
A = down	
Z = left	
X = right	
Caps Shift = curse	

To bless or curse a grave, or destroy the opponent, just place the appropriate figure over a grave or opponent and press the correct key. The keys to be used are given in table 1. The only safe place for each player is in the entrance to his own castle. There are five degrees of difficulty with 1 as the hardest and 5 the easiest. Each level of difficulty doubles the speed.

The program is in three parts:

- The main loader, a short Basic program — listing 1.
- Character definition, saved as bytes to define the user definable characters used. This is produced by listing 2.
- The machine-code game program.

The machine code part is presented as a memory dump which must be entered into the computer with the loader provided in listing 3.

Type in listing 1 and save by

SAVE "VAMPIRE" LINE 1

Type in listing 2 and run it. Select graphics on the keyboard and press keys A to P. Each should produce a graphic character. Save by

SAVE "VAMPG" CODE USR"a",128

Type in and run listing 3. Enter all the numbers from the machine code dump, eight at a time i.e. "3E 4B FF C3 0D EF B0 D9", then enter the checksum to verify the numbers entered. When all the code has been entered save by

SAVE "VAMPOBJ" CODE 53300,1534

Listing 1.

```
   1 REM
  10 REM ************************
  15 REM * PRIEST AND VAMPIRE *
  20 REM **** MAIN  LOADER ****
  30 REM ************************
  35 REM
  37 CLEAR 53299
  40 INK 0: PAPER 5: CLS : BORDE
R 4
  50 PRINT AT 7,1; PAPER 2; BRIG
HT 1;"******************************
****"
  60 PRINT AT 8,1; PAPER 7; BRIG
HT 1;"*PRIEST & VAMPIRE IS LOAD
ING*"
  70 PRINT AT 9,1; PAPER 1; BRIG
HT 1;"******************************
****"
  80 FOR I=-10 TO 0 STEP 2: BEEP
 .09,I: NEXT I
  90 INK 5
 100 LOAD "VAMPG"CODE
 110 LOAD "VAMPOBJ"CODE
 120 OUT (254),255: RANDOMIZE US
R 53300
```

Listing 2.

```
  1 REM ***********************
  2 REM ******** USER *********
  3 REM ****** GRAPHICS.*******
  4 REM ***********************
  5 REM
 10 RESTORE 100
 20 FOR i= USR "a" TO  USR "p"+7
 30 READ d
 40 POKE i,d
 50 NEXT i
 51 REM
100 DATA 1,3,3,7,13,29,62,102
110 DATA 128,192,192,224,176,184,124,114
120 DATA 219,55,31,15,7,7,6,12
130 DATA 251,228,248,240,224,224,96,0
140 DATA 3,3,7,3,1,5,14,31
150 DATA 192,192,224,192,128,160,112,248
160 DATA 31,15,7,4,15,15,2,6
170 DATA 240,240,96,160,208,240,32,0
180 DATA 7,31,63,127,127,241,245,243
190 DATA 224,248,252,254,254,71,87,71
200 DATA 243,245,246,-1,-1,-1,-1,-1
210 DATA 95,223,223,-1,-1,-1,-1,-1
220 DATA 135,29,33,37,67,127,191,156
230 DATA 225,152,132,134,194,255,253,57
240 DATA 140,134,199,71,110,44,24,135
250 DATA 49,97,227,226,116,52,24,225
300 REM ******** END **********
```

Listing 3.

```
  10 REM hex loader
  20 DEF FN h$(a)=CHR$ (INT (a/1
6)+48+7*(a>159))+CHR$ (a-16*INT
(a/16)+48+7*((a-16*INT (a/16))>9
))
  30 DEF FN n(a$)=CODE a$-48-7*(
a$>"9")
  40 FOR n=53300 TO 54838 STEP 8
  50 PRINT n;" - ";
  60 LET c=0
  70 INPUT a$
  80 PRINT a$
  90 FOR b=0 TO 7
 100 LET z=FN n(a$)*16+FN n(a$(2
))
 110 LET c=c+z
 120 POKE (n+b),z
 130 LET a$=a$(4 TO )
 140 NEXT b
 150 PRINT " = ";
 160 INPUT c$
 170 IF c<>c$ THEN PRINT "DATA E
RROR": GO TO 50
 180 PRINT c$
 190 NEXT n
```

Listing 4.

```
53300-3E 70 32 8D 5C CD 6B 0D =782
53308-3E 02 CD 01 16 11 00 50 =397
53316-21 E8 03 01 C0 02 ED E0 =876
53324-01 19 00 CD D9 0D 01 10 =499
53332-00 11 9C D0 CD 3C 20 01 =679
53340-15 16 CD D9 0D 01 12 00 =497
53348-11 90 D0 CD 3C 20 01 10 =694
53356-14 CD D5 0D 01 14 00 11 =493
53364-7C D0 CD 3C 20 C3 B4 D0 =1212
53372-42 59 20 41 64 61 6D 20 =590
53380-4D 75 72 72 61 79 20 31 =721
53388-39 38 34 2E 11 07 13 00 =251
53396-56 41 4D 50 49 52 45 21 =565
53404-12 00 13 01 11 06 13 00 =77
53412-45 4E 54 45 52 20 53 48 =572
53420-49 4C 4C 2E 31 2D 35 2E =450
53428-01 FE F7 ED 78 FE FF CA =1570
53436-B4 D0 EE FF 67 2E 00 22 =1064
53444-F4 D9 3E FF 32 8E 5C 3E =1109
53452-47 32 8D 5C CD 6B 0D 3E =741
53460-0F 32 F6 D9 3E 0F 32 F5 =900
53468-D9 3E 01 32 F2 D9 3E 1D =880
53476-32 D1 D9 3E 14 32 D2 D9 =1035
53484-32 E2 D9 3E 07 32 E1 D9 =1054
53492-3E 96 32 F0 D9 3E 02 CD =988
53500-01 16 CD ED D5 CD A2 D5 =1250
53508-01 21 10 CD D9 0D 3E 10 =571
53516-D7 3E 01 D7 06 C0 3E 8F =896
53524-D7 10 FB 01 20 13 CD D9 =956
53532-0D 3E 10 D7 3E 02 D7 001 =586
53540-09 00 11 05 D2 CD 3C 20 =536
53548-01 20 14 CD D9 0D 11 05 =518
53556-D2 01 09 00 CD 3C 20 01 =516
53564-20 15 CD D9 0D 01 09 00 =496
53572-11 FC D1 CD 3C 20 01 09 =787
53580-13 CD D9 0D 3E 10 D7 3E =805
53588-06 D7 01 09 00 11 05 D2 =463
53596-CD 3C 20 01 0B 14 CD D9 =751
53604-0D 01 09 00 11 05 D2 CD =460
53612-3C 20 01 0B 15 CD D9 0D =560
53620-01 09 00 11 FC D1 CD 3C =753
53628-20 01 0B 16 CD D9 0D 3E =563
53636-10 D7 3E A6 D7 CD D9 0D =949
53644-3E 20 D7 0D 0D 79 FE 01 =711
53652-C2 89 D1 01 20 16 CD D9 =1017
53660-0D 3E 10 D7 3E 02 D7 CD =790
53668-D9 0D 3E 20 D7 0D 0D 79 =586
53676-FE 16 C2 A3 D1 01 0D 10 =872
53684-CD D9 0D CD 27 D4 04 0D =908
53692-0D 0D 0D 79 FE 01 C2 84 =709
53700-D1 0E 0D 05 05 05 05 78 =376
53708-FE 04 C2 84 D1 2001 1F 10 =809
53716-C3 D9 0D CD 7E D4 04 0D =995
53724-0D 0D 0D 79 FE 13 C2 D4 =839
53732-D1 0E 1F 05 0005 05 05 78 =394
53740-FE 04 C2 D4 D1 01 14 16 =916
53748-CD D9 0D 3E 07 32 8D 5C =787
53756-58 58 58 58 58 58 58 58 =704
53764-58 20 20 20 0F 0F 0F 20 =645
53772-20 20 9A 9B ED 4B E4 D9 =1130
53780-03 78 B1 FE 00 C2 14 D2 =986
53788-01 FE EF ED 78 FE FD CC =1514
53796-D3 D4 01 FE DF ED 78 FE =1512
53804-FE C2 99 D4 01 FE FB ED =1566
53812-78 FE FE CC 88 D4 01 FE =1486
53820-FD ED 78 FE FE CC EB D4 =1769
53828-01 FE FE ED 78 FE FB CC =1575
53836-22 D5 FE FD CC 5F D5 FE =1520
53844-FE C2 42 D4 01 FE 7F ED =1355
53852-78 FE F7 CC 03 D5 FE EF =1534
53860-CC 41 D5 FE FD CC EB D3 =1639
53868-ED 43 F0 D9 0B ED 43 F0 =1324
53876-D9 79 B1 CC 7C D3 CD C8 =1458
53884-D2 C3 82 D2 CD 86 D2 C3 =1547
53892-10 D2 3A F5 D9 FE 10 CA =1226
53900-FF D2 FF A6 CA DE D2 ED =1595
53908-4B D1 D9 2A E1 D9 78 BC =1293
53916-C2 81 D2 79 8D C2 81 D2 =1472
53924-3A F2 D9 FE 00 CA FE D2 =1437
53932-FE 01 CA CE D2 C9 ED 4B =1402
53940-D1 D9 78 FE 14 C2 C7 D2 =1423
53948-79 FE 08 CA FE D2 FE 07 =1310
53956-CA FE D2 C9 ED 4B E1 D9 =1221
53964-78 FE 14 C2 DD D2 79 FE =1394
53972-1C CA DE C2 FE 1D CA DE =1369
53980-D2 C9 01 16 0D CD D9 0D =862
53988-11 F4 D2 01 0A 00 CD 3C =747
53996-20 CD 14 D3 C3 5D D3 C9 =1168
54004-45 56 49 4C 20 57 49 4E =574
54012-50 2E 01 16 0D CD D9 0D =660
54020-11 58 D3 01 0A 00 CD 3C =564
54028-20 CD 14 D3 C3 5D D3 C9 =1168
54036-01 18 04 CD D9 0D 11 41 =546
54044-D3 01 0F 00 CD 3C 20 06 =530
54052-0A C5 21 0F 00 11 14 00 =252
54060-E5 CD B5 03 E1 11 10 00 =876
54068-A7 ED 52 7D FE FF C2 29 =1363
54076-D3 C1 13 E5 C9 41 4E 4F =1072
54084-54 48 45 52 20 47 4F 20 =521
54092-59 2F 4E 3F 47 4F 4F 44 =574
54100-20 57 49 4E 53 2E C3 6A =700
54108-D3 01 FE DF ED 78 FE EF =1539
54116-C2 5A D3 C3 34 00 3A 78 =1120
54124-5C D3 FE 01 FE 7F ED 78 =1296
54132-FE F7 C2 5D D3 CD EE 1C =1470
54140-3A F2 D9 FE 01 C2 8D D3 =1318
54148-CD B7 D3 3E 00 32 F2 D9 =1170
54156-C9 CD 96 D3 3E 01 32 F2 =1122
54164-D9 C9 01 C0 00 11 00 58 =716
54172-1A FE 30 C2 A5 D3 3E 41 =1038
54180-12 13 0B 78 B1 C2 9C D3 =906
54188-01 96 00 ED 43 F0 D9 CD =1117
54196-D8 D3 C9 01 C0 00 11 00 =836
```

(continued on page 166)

(continued from page 163)

```
54204-58 1A FE 41 C2 C6 D3 3E =1058A
54212-3D 12 13 08 7E 81 C2 8D =785
54220-D3 01 96 00 ED 43 F0 D9 =1123
54228-CD D8 D3 C9 11 14 00 21 =903
54236-D0 07 CD B5 03 11 0A 00 =531
54244-21 E8 03 CD B5 03 C9 3A =916
54252-F2 D9 FE 01 CF 41 D4 ED =1430
54260-4A F1 D9 CD D5 8D 2A 84 =1126
54268-5C 7E FE 04 C2 41 D4 04 =1079
54276-04 C5 3A F5 D5 3C 32 F5 =1076
54284-D9 C1 ED 43 E1 D9 CD 7D =1466
54292-D5 21 6D 06 11 05 00 CD =586
54300-B5 03 ED 4B E1 D9 05 05 =946
54308-CD D9 0D FD CE 57 86 3E =1174
54316-10 D7 3E 04 D7 3E 90 D7 =941
54324-3E 99 D7 05 CD D9 0D 3E =932
54332-9A D7 3E 96 D7 C9 3A F2 =1302
54340-D9 FE 00 CA 96 D4 ED 4B =1349
54348-D1 D9 CD D9 0D 2A 84 5C =1127
54356-7E FE 06 C2 98 D4 C5 3A =1159
54364-F5 D9 3D 32 F5 D9 C1 04 =1232
54372-04 ED 43 D1 D5 CD C0 D5 =1352
54380-21 6E 06 11 05 00 CD B5 =557
54388-03 ED 4B D1 D9 05 05 CD =956
54396-D9 0D FD CB 57 86 3E 10 =985
54404-D7 3E 03 D7 3E 9C D7 3E =992
54412-9D D7 05 CD D9 0D 3E 9E =1032
54420-D7 3E 9F D7 C9 ED 4B E1 =1389
54428-D9 04 CD B1 D4 CA 80 D4 =1405
54436-ED 4E E1 D9 04 ED 43 E1 =1287
54444-D9 CD 7D D5 C9 CD D9 0D =1396
54452-2A 04 5C 7E FE FF C9 CD =1309
54460-4B D1 D9 04 CD B1 D4 CA =1301
54468-D2 D4 ED 4B D1 D9 04 ED =1401
54476-43 D1 D9 CD C8 D5 C9 ED =1549
54484-4B E1 D9 78 FE 04 CA EA =1331
54492-D4 005 ED 43 E1 D9 CD 7D =1293
54500-D5 04 ED 43 E1 D9 C9 ED =1401
54508-4B D1 D9 78 FE 04 CA 02 =1083
54516-D5 05 ED 43 D1 D9 CD C8 =1353
54524-D5 04 ED 43 D1 D9 C9 ED =1385
54532-4B E1 D9 0D 0D CD E1 D4 =1137
54540-CF 21 D5 ED 43 E1 D9 79 =1323
54548-FE 03 CA 21 D5 0D ED 43 =1022
54556-E1 D9 CD 7D D5 C9 ED 4B =1498
54564-D1 D9 0D 0D CD B1 D4 CA =1248
54572-40 D5 ED 4B D1 D9 79 FE =1390
54580-03 CA 40 D5 0D ED 43 D1 =1008
54588-D9 CD C8 D5 C9 ED 4B E1 =1579
54596-D5 0C CD B1 D4 CA 5E D5 =1332
54604-ED 4B E1 D9 79 FE 21 CA =1364
54612-5E D5 0C ED 43 E1 D9 CD =1270
54620-7D D5 C9 ED 43 D1 D9 0C =1289
54628-CD B1 D4 CA 7C D5 ED 4B =1445
54636-D1 D9 79 FE 21 CA 7C D5 =1373
54644-0C ED 43 D1 D9 CD C8 D5 =1360
54652-C9 3E 02 CD 01 16 11 01 =511
54660-00 21 FC 05 CD B5 03 ED =915
54668-4E E8 D9 CD 8A D5 3A 8F =1319
54676-FF EE 06 32 8F FF 3A 97 =1136
54684-FF EE 30 32 97 FF ED 4B =1329
54692-E1 D9 CD B0 D5 2A E1 D9 =1520
54700-22 E8 D9 C9 FD CB 57 C6 =1425
54708-CD D9 0D 3E 94 C7 3E 95 =1071
54716-D7 05 CD D9 0D 3E 96 D7 =1032
54724-3E 97 D7 C9 3E 02 CD 01 =899
54732-16 11 01 00 21 FC 08 CD =533
54740-B5 03 ED 43 D8 C9 CD FB =1333
54748-D5 3A 6F FF EE 0C 32 6F =1048
54756-FF 3A 77 FF EE 30 32 77 =1142
54764-FF ED 4B D1 D9 CD FB D5 =1662
54772-2A D1 D9 22 D8 D9 C9 FD =1389
54780-CB 57 C6 CD D9 0D 3E 90 =1129
54788-D7 3E 91 D7 05 CD D9 0D =1077
54796-3E 92 D7 3E 93 D7 C9 D7 =1263
54804-C9 22 D8 D9 C9 FD CB 57 =1412
54812-C6 CD C9 0D 3E 90 D7 3E =1116
54820-91 D7 05 CD D9 0D 3E 92 =1008
54828-D7 3E 93 D7 C9 C9 00 00 =1041
   LENGTH=1332 BYTES.
```

Reset

M Warren,
Lewes,
Sussex.

ORIC

THE ORIC HAS a reset button. It works extremely well except that to operate it requires the use of a screwdriver. As a more professional method, here is a routine that allows Ctrl Z to be used instead.

It works by intercepting interrupts and diverting them to 400 hex, where a short routine checks to see if Control and Z are pressed. If they are control passes to a ROM routine at F40C hex — the reset routine.

Oric reset.

```
10 REPEAT
20 READ D$
30 C=VAL("#"+D$)
40 POKE#400+T,C
50 T=T+1
60 UNTIL D$="END"
70 :
100 DATA48,BA,48,98,48,20,00,97,68,A8
110 DATA 68,AA,68,4C,03,EC,"END"
120 T=0
130 REPEAT
140 READ D$
150 C=VAL("#"+D$)
160 POKE#9700+T,C
170 T=T+1
180 UNTIL D$="END"
200 DATAAD,09,02,C9,A2,F0,01,60
210 DATAAD,0F,03,C9,DF,F0,01,60
220 DATAAD,10,03,C9,BA,F0,01,60
230 DATA4C,30,F4,"END"
240 DOKE#229,#400
250 NEW
260 REM ******** CHECK AND SAVE BEFORE RUNNING!******
```

Frequency analyser

K Shields,
Birkenhead,
Merseyside.

SPECTRUM

THIS PROGRAM is written for and converts the 48K Spectrum into a frequency analyser. When music or sound is played in through the ear socket, a graph on the screen — generated by machine code — shows the frequencies present in the sound and the relative amplitude of those frequencies.

The easiest way of seeing this is to plug a cable from the ear socket of the tape recorder into the ear socket of the Spectrum and play a tape containing music. The graphic produced is a bar graph showing the lowest frequencies at the top of the screen and the highest at the bottom; the amplitude is shown across the screen.

Get a blank tape and rewind it. Then forward it a short way — enough to save a Basic program of about 10 lines.

Type in program 1. When program 1 is run, it will check the data and if it is correct it will ask if you want to save the machine code, type Y.

Rewind the tape, type New then type in program 2. When you have entered this program type

SAVE "BASIC" LINE 1

Rewind the tape, type New and then type

LOAD ""

and press play on the tape recorder. This should load the Basic program which will automatically load the machine code.

Play your music through the ear socket and a bar graph should be shown on the screen.

Program 1.

```
  1 LET ADD=45056
  3 LET LINE=100: FOR X=1 TO 15
  5 LET SUM=0
 12 FOR Y=1 TO 11
 15 READ A
 16 POKE ADD,A
 20 LET SUM=SUM+A: LET ADD=ADD+1
 22 NEXT Y
 25 READ A: IF SUM<>A THEN PRINT "ERROR AT LINE ";LIN
E: STOP
 35 LET LINE=LINE+10: NEXT X
 40 CLS : PRINT INVERSE 1; FLASH 1;"  PRESS ANY KEY T
O SAVE MC CODE ": PAUSE 0
 50 SAVE "MC_FREQ"CODE 45056,170
 60 PRINT : PRINT "DO YOU WANT TO SAVE ANOTHER COPY"
 70 PAUSE 0: LET A$=INKEY$
 80 IF A$="Y" OR A$="y" THEN GO TO 40
 90 STOP
100 DATA 62,0,50,0,179,6,0,33,0,177,112,619
110 DATA 35,125,254,255,194,10,176,6,0,219,250,1524
120 DATA 79,17,0,0,219,250,185,202,34,176,79,1241
130 DATA 4,20,122,254,255,194,26,176,14,0,33,1098
140 DATA 0,177,120,185,242,54,176,195,61,176,12,1398
150 DATA 12,12,35,195,46,176,126,60,119,58,0,839
160 DATA 179,254,39,202,79,176,60,50,0,179,195,1413
170 DATA 18,176,6,0,33,0,177,34,0,180,33,657
180 DATA 0,88,34,2,179,62,0,50,80,179,42,716
190 DATA 0,180,126,184,242,111,176,62,24,195,113,1413
200 DATA 176,62,38,42,2,179,119,62,127,219,254,1280
210 DATA 31,206,42,2,179,35,34,2,179,4,120,836
220 DATA 254,32,194,98,176,58,80,179,254,21,202,1548
230 DATA 161,176,60,50,80,179,6,0,42,0,180,934
240 DATA 35,34,0,180,195,98,176,195,0,176,0,1089
```

Program 2.

```
  1 LOAD ""CODE : BORDER 7
```

(continued on page 169)

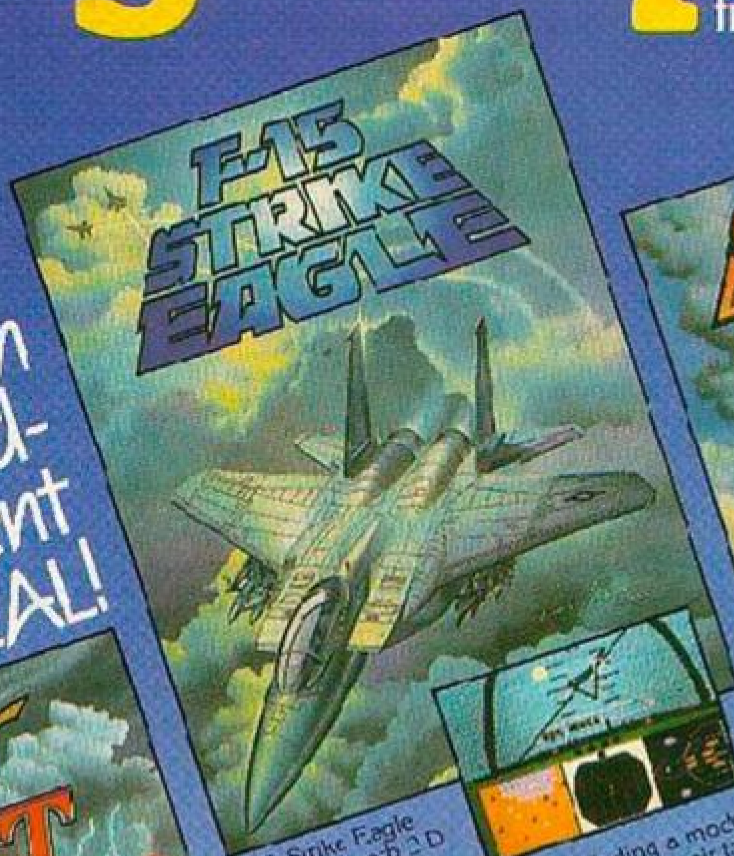
New

High Flyers!

from MicroProse Software



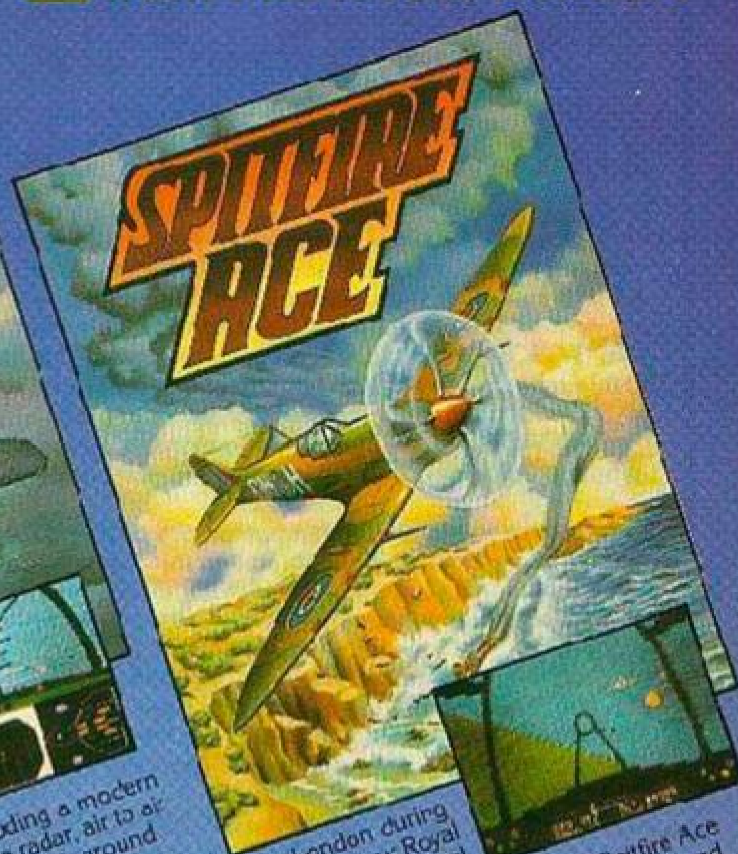
The action is simulated - The excitement is REAL!



F-15 Strike Eagle features superb 3D graphics, F-15 manoeuvreability, computer assisted targetting including a modern fighter Heads Up Display, airborne radar, air to air missiles, surface to air missile defence, ground target bombing, full aerobatics, and multiple combat scenarios.

£14.95

DISK/CASSETTE



Save London during the Blitz in your Royal Marine Spitfire fighter! Featuring outstanding out-of-the cockpit 3D graphics. Spitfire Ace provides 14 different combat scenarios and fast paced action. For 1-4 players.

CASSETTE **£9.95**

DISK **£12.95**



Grab your joystick and take off with this user friendly flight simulator that is 'All the flying challenge you can handle!' Includes outstanding 3D graphics, full cockpit instrumentation, dual VORs, ILS, 21 different airports, landing scoring and real life challenges from weather, instrument and mechanical emergencies.

£14.95

DISK/CASSETTE

No.1 Flight Simulation



Defend Europe in a heart pounding, accelerated real time war situation! Use your full continent scrolling battle map to destroy, manoeuvre and command the battle unit, including infantry, armour, helicopters, air forces, and tactical nuclear weapons to stop the ever advancing Warsaw Pact battle units.

CASSETTE **£9.95**

DISK **£12.95**

★★★★★★★★★★★★★★★★★★★★★★★★

THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD

U.S. Gold is stocked by all leading computer stores including:

BOOTS WHSMITH JOHNMENZIES WILDINGS

DEALERS! For information on how to become a U.S. Gold Stockist write to: CentreSoft Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH. Telephone: 021-520 7591. Telex: 337268.
Overseas enquiries welcome.

U.S. GOLD

All American Software

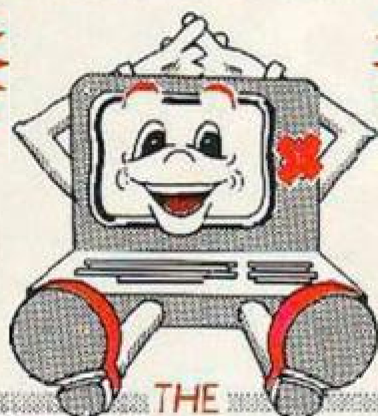
MAKE SURE YOUR HOME COMPUTER WORKS... FOR YEARS AND YEARS

Guarantee years of service from your home computer.
Protect your investment by joining the MICRO REPAIR CLUB.
After your warranty has run out can you afford the manufacturers' repair charges which can be as high as £60 minimum?
THE MICRO REPAIR CLUB is a brand new organisation offering a unique scheme which guarantees that should your computer break down, it will be repaired at absolutely no cost.
THE MICRO REPAIR CLUB has been formed to save you money and ensure that your computer is in tip-top working condition for years to come.

A one-year membership that guarantees all repairs to your micro costs only £24.95, with an annual renewal of £14.95.
A two-year membership costs £35.95, three years £46.95.
For incredible value for money a four-year membership costs only £57.95.

All prices are inclusive of VAT

THE MICRO REPAIR CLUB is backed by one of the world's largest insurance groups and the actual repair work will be carried out by Computeraid Services, a division of Thorn EMI Information Technology Ltd.
There can be no greater protection. So if you own a Sinclair, BBC, Acorn, Dragon, Commodore or any other home computer join the Club by ringing the HOTLINE on 01-946 7777 or clip the coupon below and send it to:
Micro Repair Club Limited, Swan Court, Mansel Road, Wimbledon, London SW19 4AA.



Members watch out for more great bargains in the future

Teachers find out about our special offer for schools

THE
MICRO
REPAIR
CLUB

I would like to join the MICRO REPAIR CLUB for ______ years and look forward to receiving my full membership pack.
I enclose a cheque for £24.95 ☐ One year's membership*
£35.95 ☐ Two years £46.94 ☐ Three years £57.95 ☐ Four years
Made payable to Micro Repair Club Limited *Please tick relevant box
Please debit my Visa/Access card No: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
Card expires on __________ Signature __________
Name __________
Address __________
I own a __________ home computer and it is in working order.

BETA BASIC 1.8

ENHANCED BASIC FOR SPECTRUM 48K

FOR GRAPHICS — STRUCTURED PROGRAMMING — DATA HANDLING

Release 1.8 is more powerful than ever! We don't have space to do this program justice — if you can't believe the ad, send us a large S.A.E. for further information.

Features. Commands are single-entry keywords in graphics mode. Syntax is checked on entry. Fully compatible with Spectrum Basic. Microdrive compatible. Comprehensive manual.
NOTE: Release 1.0 is still available for 16/48K Spectrum at £11.00.

ALTER screen colours (general or specific)
AUTO line numbering
BREAK out of stuck loops
CLOCK digital clock
CURSOR CONTROL CODES allow strings to hold complex shapes
DEF KEY user definable keys
DELETE a block of lines
DO LOOP structure
DPOKE double poke
EDIT specified line
ELSE (used with IF...THEN)
EXIT leave DO-LOOP
FILL enclosed area with specified ink or paper
GET wait for keypress
JOIN two program lines
KEYIN a string
KEYWORDS new keywords on/off
LIST/LLIST line TO line
LABEL (used with GOTO, GOSUB)
ON ERROR trap errors (with LINE, STAT and ERROR)
PLOT a string (may contain cursor control codes)
POKE a string
POP Basic's stack
PROC, DEF PROC, END PROC for named procedures
RENUM versatile renumber
ROLL all or part of screen in any direction by specified number of pixels, with or without attributes
SCROLL like ROLL, but without wrap round
SORT arrays (very fast)
SPLIT program lines
TRACE program execution
UNTIL used with DO or LOOP
USING used with PRINT
WHILE used with DO or LOOP
XOS, YOS move PLOT origin
XRG, YRG change PLOT scale

FUNCTIONS

AND (bit-by-bit)
BIN$ decimal to binary
CHAR$ number to 2 characters
COSE fast cosine
DEC hexadecimal to decimal
DPEEK double PEEK
FILLED filled area
HEX$ decimal to hexadecimal
INSTRING string search
MEM free memory
MEMORY$ all of memory as a string
MOD modulus
NUMBER 2 characters to number
OR (bit-by-bit)
RNDM fast RND
SCRN$ recognises user graphics
SINE fast sine
STRING$ repeats strings
TIME$ current time
USING$ formats numbers
XOR (bit-by-bit)

Only £11.00 inclusive! (Upgrade price for Release 1.0 owners is £4.00. This includes a 12-page supplement to your manual. Please quote date of purchase. If you did not purchase from us, state supplier and return original cassette.)

Please send me:
Beta Basic, Release 1.8. Payment of £11.00 is enclosed (or £11.50 for foreign orders). Cheques payable to BETASOFT.

I don't believe it! Please send me full details of Beta Basic 1.8. I enclose a stamped addressed envelope.

NAME: ....
ADDRESS ....
....

BETASOFT
92 OXFORD ROAD, MOSELEY, BIRMINGHAM B13 9SQ.

MW MW

THE MICRO WORKSHOP

MICRO COMPUTER SPECIALISTS

(Spectrum Group Member)

Software and hardware over the counter for Sinclair Spectrum, ZX-81, BBC,. Vic-20, CBM-64, Memotech, Amstrad, etc..

* COMPUTERS * RAMPACKS
* JOYSTICKS * BOOKS
* KEYBOARDS * DISCS
* TAPES * LIGHT PENS
* COMPONENTS *

Business/Serious Programs available
Located directly opposite Epsom Main Line Station. Visit us or ring for friendly service. See and try before you buy.

Overseas/Export orders welcome

12 STATION APPROACH
EPSOM, SURREY.
EPSOM 21533

(continued from page 166)

```
2 GO SUB 100
  5 CLS : PRINT "Press any key to execute
s BREAK to stop"
  10 PAUSE 0
  15 FOR Y=0 TO 21
  20 PRINT AT Y,0;""
  30 NEXT Y
  40 RANDOMIZE USR 45056
  50 STOP
100 POKE USR ""  ,255
110 POKE USR ""+1,129
120 POKE USR ""+2,129
130 POKE USR ""+3,129
140 POKE USR ""+4,129
150 POKE USR ""+5,129
160 POKE USR ""+6,129
165 POKE USR ""+7,255
180 RETURN
```

Keyboard

P Brett,
Wellinborough,
Northamptonshire.



THIS PROGRAM turns the Commodore 64 into a true Polyphonic keyboard instrument. It makes use of a specially written keyboard routine which can detect any combination of keys but due to the construction of the 64's keyboard some combinations of keys cause extra "ghost" keys to register.

The Basic loader routine contains a checksum on each line of data and a check for missed lines. Line 180 defines the envelope of all voices and line 190 the pulse width for the pulse waveform.

Here is a sample tune to try:

Key Duration.

T	I	P	I	@	P	O	
1	2	3	1	1	1	3	
T	U	I	O	@	P	O	I
1	'	1	3	1	1	1	3
T	I	O	P	*	↑	@	O
1	'	1	3	1	1	1	3
I	U	Y	T	*	F		
1	1	1	2	2	2		

```
1 REM
2 REM COPYRIGHT (C) 1984
3 REM   BY PAUL BRETT
4 REM
10 PRINT"■■■■ ■ ■ ■ | ■ ■ ■ | ■ ■ | ■ ■ "
20 PRINT"■■■■ ■ ■ ■ | ■ ■ ■ | ■ ■ | ■ ■ "
30 PRINT"■■■■ ■ ■ ■ | ■ ■ ■ | ■ ■ | ■ ■ "
40 PRINT"■■■■ ■ ■ ■ | ■ ■ ■ | ■ ■ | ■ ■ "
50 PRINT"■■■■ ■ | | | | | | | | | | | | "
60 PRINT"■■■■ ■Q|W|E|R|T|Y|U|I|O|P|■|*|↑"
70 PRINT"■■■■■■■■F1:TRIANGLE WAVEFORM"
80 PRINT"■■■■■■■■F3:SAWTOOTH WAVEFORM"
90 PRINT"■■■■■■■■F5:PULSE WAVEFORM"
100 PRINT"■■■■■■■■F7:EXIT"
110 PRINT"■■■■■■■■■■LOADING MACHINE CODE"
120 IFPEEK(49152)=32ANDPEEK(49153)=93THEN180
130 FORC=49152TO49655STEP8:CK=C-256*INT(C/256):FORCC=0TO7:READM:CK=(CK+M)AND255
140 POKEC+CC,M:NEXT
150 IF(PEEK(63)+256*PEEK(64))<>CTHENPRINT"■■■LINE"C"■ MISSING":POKE49152,96:END
160 READM:IFM<>CKTHEN210
170 NEXT
180 AD=088:SR=195:POKE49278,AD:POKE49289,SR
190 PL=000:PH=008:POKE49256,PL:POKE49267,PH
200 PRINT"■■■■■■■■■                                  ":SYS49152:END
210 PRINT"■■■ERROR IN LINE"PEEK(63)+256*PEEK(64):POKE49152,96:END
49152 DATA32,93,192,32,28,192,32,169,2
49160 DATA192,32,1,193,162,50,160,0,30
49168 DATA136,208,253,202,208,250,32,199,224
49176 DATA193,76,3,192,120,162,7,169,178
49184 DATA127,141,0,220,72,173,1,220,218
49192 DATA157,244,193,104,56,106,202,16,94
49200 DATA240,88,162,63,169,255,157,252,154
49208 DATA193,202,16,250,162,0,150,3,15
49216 DATA189,244,193,134,251,162,7,10,230
49224 DATA72,144,5,169,0,153,252,193,36
49232 DATA200,104,202,16,242,166,251,232,213
49240 DATA192,64,208,228,96,162,24,169,207
49248 DATA0,157,0,212,202,16,250,169,78
49256 DATA160,141,2,212,141,9,212,141,98
49264 DATA16,212,169,15,141,3,212,141,250
49272 DATA10,212,141,17,212,169,3,141,254
49280 DATA5,212,141,12,212,141,19,212,38
49288 DATA169,245,141,6,212,141,13,212,255
49296 DATA141,20,212,169,15,141,24,212,54
49304 DATA169,255,141,52,3,141,53,3,201
49312 DATA141,54,3,169,64,141,55,3,22
49320 DATA96,174,52,3,48,24,189,252,238
49328 DATA193,240,8,169,0,157,252,193,108
49336 DATA76,198,192,173,55,3,141,4,2
49344 DATA212,169,255,141,52,3,174,53,227
49352 DATA3,48,24,189,252,193,240,8,133
49360 DATA169,0,157,252,193,76,227,192,154
49368 DATA173,55,3,141,11,212,169,255,211
49376 DATA141,53,3,174,54,3,48,24,212
49384 DATA189,252,193,240,8,169,0,157,168
49392 DATA252,193,76,0,193,173,55,3,161
49400 DATA141,18,212,169,255,141,54,3,217
49408 DATA96,162,0,134,251,173,52,3,103
49416 DATA48,11,173,53,3,48,6,173,11
49424 DATA54,3,48,1,96,189,130,193,218
49432 DATA168,185,252,193,240,3,32,39,112
49440 DATA193,232,224,23,208,223,96,173,124
49448 DATA32,3,16,3,76,80,193,173,124
49456 DATA53,3,16,3,76,105,193,152,137
49464 DATA141,54,3,189,153,193,141,14,176
49472 DATA212,189,176,193,141,15,212,173,95
49480 DATA55,3,9,1,141,18,212,96,95
49488 DATA152,141,52,3,189,153,193,141,88
49496 DATA3,212,189,176,193,141,1,212,100
49504 DATA173,55,3,9,1,141,4,212,182
49512 DATA96,152,141,53,3,189,153,193,69
49520 DATA141,7,212,189,176,193,141,8,155
49528 DATA212,173,55,3,9,1,141,11,213
49536 DATA212,96,57,60,14,15,9,22,101
49544 DATA23,17,20,30,31,25,38,39,103
49552 DATA33,36,46,41,44,54,55,49,246
49560 DATA52,135,134,162,223,62,193,107,196
49568 DATA50,57,99,190,75,15,12,69,225
49576 DATA191,125,131,214,121,115,199,124,188
49584 DATA33,35,37,39,42,44,47,50,247
49592 DATA53,56,59,63,67,71,75,79,195
49600 DATA84,89,94,100,106,112,119,173,45
49608 DATA255,193,240,6,169,16,141,55,251
49616 DATA3,96,173,254,193,240,6,169,62
49624 DATA32,141,55,3,96,173,253,193,138
49632 DATA240,6,169,64,141,55,3,96,230
49640 DATA173,0,194,240,6,104,104,169,196
49648 DATA3,133,198,96,0,0,0,0,155
```

Stop! Thief!

Paul Sweeting,
Bromsgrove,
Worcestershire.



IN THIS GAME you are Harry the burglar and you have broken into a house. The object is to steal every thing valuable in sight.

I will not go into all the in's and out's of the game but I will just give you the basic idea.

There are five rooms in the house which all interconnect. They are: the entrance hall which is where you start, the kitchen to the left of the entrance hall, the lime room above the entrance hall, the conservatory to the left of the lime room and the attic on top.

In each room there is a nasty. Here's a list of them:

The entrance hall: a cricket bat.
The kitchen: a custard pie.
The conservatory: a blue flower.
The lime room: a lime.
The attic: a ghost

The valuable items are represented by flashing signs.

Here are some other points you may find interesting:

- If you do not wish to go up some stairs in front of you then jump through them.
- To go down a rope, just walk over the top of it.
- You can't go up a rope.
- When you have stolen all the flashing then go back to the entrance hall where the exit will be shown.

When typing in the game, first type in program 1 and save it, then type in program 2 and save it directly after program 1. Always run program 1 before program 2.

Program 1.

```
   10MODE2:COLOUR134:CLS:VDU19,1,6;0;:VDU23;8202;0;0;0
;
   20COLOUR1:VDU23,255,24,36,66,129,129,66,36,24:FORI=
0TO30:PRINTTAB(0,I);STRING$(20,CHR$255);:NEXTI
   30GCOL0,1:VDU5:MOVE0,32:PRINTSTRING$(20,CHR$255);:V
DU4:VDU19,1,1;0;
   40GCOL0,4:MOVE96,992:DRAW96,800:PLOT85,1184,800:DRA
W1184,992:PLOT85,96,992
   50MOVE320,928:GCOL0,0:VDU5:PRINT"STOP!THIEF!
                     By Paul Sweeting":MOVE330,932:GCOL0
,7:PRINT"STOP!THIEF!                            By Paul
Sweeting"
   60VDU4:GCOL0,4:MOVE96,736:DRAW96,576:PLOT85,1184,57
6:DRAW1184,736:PLOT85,96,736
   70COLOUR3:COLOUR132:PRINTTAB(5,10)"LEFT.....Z";TAB(
5,11)"RIGHT....X";TAB(5,12)"JUMP...RET";
   80VDU20,2,26,17,21:CLS
   90VDU23,224,0,126,126,126,0,231,231,231,23,226,24,5
2,62,60,24,60,126,153,23,227,255,153,231,255,126,60,24
,28
  100VDU23,228,24,44,124,60,24,60,126,153,23,229,255,1
53,231,255,126,60,24,56,23,230,255,153,231,255,102,198
```

(continued on page 173)

become.

Will you think the same of your micro in 6 months' time?

Remember the days when every record player was gifted with a needle instead of a stylus. 45's were "in," 78's were "out."

Before the days of hi-fi and laser discs. When a graphic equaliser was a breakthrough on the football pitch instead of in music technology.

Look at a record player now and it's a museum piece.

It's like that with micros too. The machine you thought would give endless hours of fun and interest often becomes a five minute wonder. Played out within months. Or so you thought.

But imagine communicating with other micro users on a nationwide mainframe system. Updating yourself daily with the very latest computer news and reviews. Paging a special Bulletin Board. Feasting from *Prestel's vast menu. Even downloading a choice of software *absolutely free.*

In fact, imagine 30,000 pages at your fingertips and you've imagined what it's like to be on line with the Micronet 800 system.

For just £13 a quarter (and, for most of you, a local telephone call whenever you want to connect up) you could subscribe to the Micronet system.

The only extra you need to connect up is a modem unit. Which is a small enough outlay for what it buys.

Micronet's features are almost limitless and constantly updating so why not see it in action at John Lewis stores, selected W. H. Smith shops and Spectrum UK dealers.

Or fill in the coupon for our brochure.

You'll find you won't want to play on anything else.



Please send me the full facts about Micronet 800.

Name ____________

Make/Model of Micro ____________

Address ____________

____

Telephone ____________

MICRONET 800, Durrant House, 8 Herbal Hill, London EC1R 5EJ. Telephone 01-278 3143.

YC10

*Prestel and the Prestel symbol are trademarks of British Telecommunications.

Making the most of your micro.

ARE YOU THE HOME COMPUTER RETAILER OF THE YEAR? 1984



Micro Business, the monthly journal for computer dealers, and Websters Software are organising a major competition to find the Home Computer Retailer of the Year.

If you have an established, imaginative or particularly successful approach to home computer retailing, you could become the Micro Business Websters Software Retailer of the Year.

1st Prize £1,000 ◇ 2nd Prize £500 ◇ 3rd Prize £250

This easy to enter competition is open to all home computer/ software dealers. To enter telephone 01-661 3687 to receive your entry form.

Phone now for your entry form.

Eectrical Electronic Press Marketing Department, Quadrant House, The Quadrant, SUTTON, Surrey SM2 5AS.

(continued from page 169)

```
,198,135,23,231,255,153,231,255,102,99,99,225
  110VDU23,232,255,141,253,251,62,254,246,135,23,233,2
55,177,191,223,124,127,111,225,23,237,255,255,128,128,
128,128,128,128,23,238,255,255,1,1,1,1,1,1,23,239,8,16
,8,16,8,16,8,16
  120VDU23,234,24,60,126,153,153,255,102,36,23,235,60,
24,24,48,96,128,0,0,23,236,0,0,85,170,255,126,126,60
  130VDU23,240,24,44,94,255,255,126,60,24:VDU23,241,24
,24,24,24,24,60,66,23,242,66,66,66,66,66,66,36,24:V
DU23,243,24,60,66,219,219,66,60,24,23,244,24,24,24,24,
153,90,60,0
  140ENVELOPE2,4,50,50,20,70,30,30,90,90,-50,-50,126,5
0:ENVELOPE1,8,10,6,-1,0,0,255,109,-1,0,-1,126,126:VDU2
3,225,8,12,254,255,255,254,12,8
  150CHAIN""
```

Program 2.

```
  10ON ERROR VDU4:CLS:REPORT:PRINT" at line ";ERL;:EN
D
  20DIMA$(3,2),A%(3,5),B%(3,5):HI%=100:H$="PAUL":MODE
2:VDU23;8202;0;0;0;:LI%=0
  30C_B:PROCinit:VDU4:PROCscreen
  40S%=0
  50PROCman:PROCnasty:PROCman:IF INKEY(-68) THEN 60 E
LSE GOTO 50
  60REPEAT:UNTIL INKEY(-56):GOTO50
  70DEFPROCman
  80OX=X%:HX=Y%:V%=W%:U%=Z%:W%=0:IF POINT(X%,Y%-64)=0
 ANDPOINT(X%+56,Y%-64)=0 AND J%=FALSE THEN PROCdie:W%=
V%:GOTO260
  90IF INKEY(-74)AND X%<>4AND J%=FALSE THEN J%=TRUE:T
J%=1:Y%=Y%-32:A$=A$(V%,U%):SOUND2,2,150,3
  100IFJ%=TRUE THEN270
  110IF INKEY(-67) THEN W%=1
  120IF INKEY(-98) THENW%=2
  130IF W%=0 THEN W%=V%:ENDPROC
  140X%=X%-32*(W%=2)-32*(W%=1):SOUND1,-10,5,1
  150Z%=Z%-(Z%=1)*(Z%=2)
  160[illegible]0,170
  170IFPOINT(X%+24,Y%-32)=5THENY%=Y%+32 ELSE GOTO190
  180IF Y%>1024 THEN PROCnewscreen(4)
  190IF X%<64 THEN PROCnewscreen(3)
  200IF POINT(X%,Y%-32)=4 THEN PROCgot ELSE 250
  210IFPOINT(X%+32,Y%-32)=5THENY%=Y%+32 ELSE 230
  220IF Y%>1024 THEN PROCnewscreen(4)
  230IF X%>1152 THEN PROCnewscreen(1)
  240IF POINT(X%+56,Y%-32)=4 THEN PROCgot ELSE 250
  250IF POINT(X%,Y%-64)=0 ANDPOINT(X%+56,Y%-64)=0 THEN
 Y%=Y%-32
  260GCOL4,0:MOVEX%,Y%:PRINTA$(W%,Z%):MOVEOX,HX:PRINTA
$(V%,U%):ENDPROC
  270W%=V%:X%=X%+24*(W%=2)-24*(W%=1):TJ%=TJ%+1:IF TJ%>
4THEN290
  280GCOL4,0:MOVEX%,Y%:PRINTA$(3,W%):MOVEOX,HX:PRINTA$
:A$=A$(3,W%):ENDPROC
  290IF POINT(X%,Y%-64)<>7 ANDPOINT(X%+56,Y%-64)<>7 TH
EN Y%=Y%-32ELSE310
  300IF POINT(X%,Y%-64)<>7 ANDPOINT(X%+56,Y%-64)<>7 TH
EN Y%=Y%-32ELSE310
  310Z%=2:GCOL4,0:MOVEX%,Y%:PRINTA$(W%,Z%):MOVEOX,HX:P
RINTA$:J%=FALSE:ENDPROC
  320DEFPROCnasty:O%=M%:RX=N%
  330PROCche
  340IF RND(7)<>1 THEN 390
  350ON F% GOTO 360,370,380
  360T%=RND(4)+2-1:GOTO390
  370T%=RND(4)+2:GOTO390
  380T%=RND(8)
  390M%=M%+32*(T%<7 AND T%>3)-32*(T%=8 OR T%<3):N%=N%+
32*(T%<5 AND T%>1)-32*(T%>5):IF M%<32 THENM%=1248
  400IF M%>1248 THEN M%=32
  410IF N%>1024 THEN N%=380
  420IF N%<380 THEN N%=1020
  430PROCche
  440GCOL3,E%:MOVEF%,N%:PRINTT$:MOVEO%,R%:PRINTT$:ENDP
ROC
  450DEFPROCche
  460IF M%<X%-32 OR M%>=X%+64 THEN ENDPROC
  470IF LEN(T$)>1 THEN 490
  480IF N%<=Y% AND N%>Y%-64 THEN 510:ELSE ENDPROC
  490IF N%<Y%+32 AND N%>Y%-56 THEN 510
  500ENDPROC
  510IF O%<>M% OR R%<>N% THEN GCOL3,E%:MOVEM%,N%:PRINT
T$:MOVEO%,R%:PRINTT$
  520PROCdead
  530DEFPROCdie
  540IF POINT(X%+24,Y%-64)=3 OR POINT(X%+32,Y%-64)=3 T
HEN Y%=Y%-32 [illegible]
  550IF Y%<416 THEN PROCnewscreen(2):ENDPROC ELSE END
PROC
  560X%=O%:Y%=H%:W%=V%:PROCdead
  570DEFPROCdead:GCOL4,0
  580IF J%=FALSE THEN MOVEX%,Y%:PRINTA$(W%,Z%):ELSE MO
VEX%,Y%:PRINTA$(3,W%)
  590SOUND1,1,150,30
  600FORI=Y%-32 TO32 STEP-32:MOVEX%,I+32:PRINTA$(W%,Z%
):MOVEX%,I-32:PRINTA$(W%,Z%):NEXT
  610I=TIME+200:REPEAT:UNTIL I=TIME
  620VDU4:LI%=LI%-1:IF LI%<1 THEN 630 ELSE CLS:SCR%=2:
PROCscreen:VDU5:A$="":X%=1088:Y%=476:W%=2:Z%=1:J%=FALS
E:TJ%=0:GCOL4,3:MOVEX%,Y%:PRINTA$(W%,Z%):GOTO40
  630IF S%<HI% THEN 660
  640HI%=S%:CLS:PRINT"You've beaten the high score!P
lease enter your name";:*FX15,0
  650INPUTH$:H$=LEFT$(H$,5)
  660COLOUR6:PRINTTAB(3,24);" G A M E  O V E R ";:CO
LOUR1:PRINTTAB(0,27);"Hit -SPACE- to start!High score:"
;HI%;" by: ";H$;
  670REPEAT UNTIL INKEY(-99):A$="":GOTO30
  680DEFPROCnewscreen(I)
  690IF SCR%=5 AND I<>2 THEN PROCdie
  700IF SCR%=2 AND I=1 THEN PROCwar
  710SCR%=SCR%-(I=3)-(I=1):SCR%=SCR% [illegible]
  720IF I=1THEN X%=64
  730IF I=2THEN Y%=1020
  740IF I=3THEN X%=1152
  750IF I=4THEN Y%=476
  760IF SCR%=1 AND I=2 THEN X%=768
  770IF SCR%=5 THEN X%=256
  780VDU4:CLS:PROCscreen:GCOL4,0:MOVEX%,Y%:W%=V%:PRINT
A$(W%,Z%):O%=X%:H%=Y%:U%=Z%:ENDPROC
  790DEFPROCgot
  800IY=[illegible]:I%=I%/32:FORII=1TO4:IFA%(II,SCR%)=I% T
HEN I%=II:II=4:NEXT ELSE NEXT
  810SOUND1,2,1,2:K%=K%+1:S%=S%+100:GCOL4,0:MOVEOX,HX:
PRINTA$(V%,U%):VDU4:PRINTTAB(A%(I%,SCR%),B%(I%,SCR%));
" ";:VDU5:MOVEOX,HX:PRINTA$(V%,U%):A%(I%,SCR%)=0
  820VDU4:COLOUR7:PRINTTAB(0,31);"SCORE: ";S%;" ";;
:VDU5
  830ENDPROC
  840DEFPROCinit
  850IF LI%>0 THEN 900
  860A$="":X%=1088:Y%=476:W%=2:Z%=1:J%=FALSE:TJ%=0:SCR
%=2:K%=0:S%=0:LI%=3
  870IF A$(1,1)<>"" THEN 900
  880RESTORE890:FORI=1TO3:READX%,H%:FORII=1TO4:READI%:
A$(X%,II)=A$(X%,H%)+CHR$(I%):NEXTII:NEXTI
  890DATA1,1,226,10,8,227,2,1,228,10,8,229,1,2,226,10,
8,230,2,2,228,10,8,231,3,1,226,10,8,232,3,2,228,10,8,2
33,4,1
  900RESTORE910:FORI=1TO5:FORII=1TO3:READX,Y:A%(II,I)=
X:B%(II,I)=Y:NEXT:NEXT
  910DATA5,16,6,7,12,2,6,2,8,5,4,10,16,11,3,8,15,2,17,
3,13,13,8,12,9,17,10,9,9,2
  920VDU19,10,7;0;:GCOL4,0:VDU5:MOVE[illegible]:PRINTA$(2,1
:ENDPROC
  930DEFPROCscreen
  940SCR%=SCR%*100:SCRX=SCRX+4000:RESTORESCRX:SCR%=SCR
%-4000:SCR%=SCRX/100:COLOUR132:COLOUR1:FORI=1TO3:IFA%
(I,SCR%)>0 THEN PRINTTAB(A%(I,SCR%),B%(I,SCR%));"";:N
EXTI ELSE NEXTI
  950COLOUR1:COLOUR135:IF SCR%=2 AND K%=15 THEN PRINTT
AB(18,19);CHR$224;:COLOUR7:COLOUR128:PRINTTAB(14,20);"
EXIT";CHR$225;:COLOUR1:COLOUR135
  960READI:FORII=1TOI:READX,Y,Z:PRINTTAB(X,Y);STRING$(
Z,CHR$224);:NEXT:COLOUR130:COLOUR3:READI:FORII=1TOI:RE
ADX,Y,Z:PRINTTAB(X,Y);STRING$(Z,CHR$239+CHR$10+CHR$8);
:NEXT
  970COLOUR3:READI:FORII=1TOI:READW,X,Y,Z:IF W=1 THEN
990
  980PRINTTAB(X,Y)STRING$(Z,CHR$238+CHR$10);:GOTO1000
  990PRINTTAB(X,Y)STRING$(Z,CHR$237+CHR$10+CHR$8+CHR$8
);
  1000NEXT
  1010COLOUR7:PRINTTAB(0,26);"SCORE: ";S%;" ";:";K%;TAB(0
,28);STRING$(LI%,CHR$226+" ");TAB(0,29);STRING$(LI%,CH
R$232+" ");:VDU5
  1020READX%,F%,T%,I:T$="":FORII=1TOI:READTT:T$=T$+CHR$
(TT):NEXT:GCOL3,E%:VDU5:M%=640:N%=700:MOVEM%,N%:PRINTT
$
  1030ENDPROC
  1100DATA5,2,13,4,17,13,4,1,19,2,7,15,4,12,15,4,6,1,5,
14,5,2,11,14,5,1,8,8,3,2,11,6,3,1,5,3,3,2,14,3,3,7,2,3
,4,234,10,8,235
  1110DEFPROCwar:RESTORE1150
  1120FORI=1TO12:READA,B,C:SOUND1,A,B,C:NEXT
  1130I=TIME+750:REPEAT:UNTIL I=TIME
  1140A$="":X%=1088:Y%=476:W%=2:Z%=1:J%=FALSE:TJ%=0:SCR
%=2:K%=0:S%=S%-500:VDU4:CLS:PROCinit:VDU4:PROCscreen:E
OTO40
  1150DATA-10,5,10,0,0,5,-10,5,5,-10,13,5,-10,21,10,0,0
,5,-10,21,5,-10,25,5,-10,33,10,-10,41,5,-10,33,5,-10,2
1,10,-10,41,5
  4100DATA15,18,19,1,16,18,1,13,17,2,9,14,2,7,15,1,5,16
,1,6,17,2,12,11,2,10,8,1,8,9,1,6,8,1,3,7,2,9,2,1,1,3,
2,15,6,4,1,9,0,2,6,2,11,14,3,1,12,11,3,2,11,8,3,1,8,2,
5,1,11,0,2,1,18,3,3,3,3,2,1,236
  4200DATA6,1,3,8,1,6,12,16,10,2,8,16,4,1,19,7,14,19,4,
3,15,0,2,9,6,10,7,16,3,4,2,11,16,3,1,15,13,6,2,13,6,4,
1,17,0,6,3,2,2,4,241,10,8,242
  4300DATA9,16,19,2,16,19,5,12,16,2,2,16,9,6,13,2,4,12
,3,9,7,2,7,3,12,3,9,2,1,9,19,2,6,2,14,16,3,1,13,13,4,
,5,13,3,2,4,9,4,1,7,3,6,1,14,0,3,6,1,3,4,243,10,8,244
  4400DATA18,,3,1,3,7,1,5,5,1,17,4,1,14,6,1,12,7,,7,8
,4,3,9,1,2,1,,2,3,14,1,8,13,2,4,16,2,7,17,2,15,18,1,16
,18,1,12,17,2,12,14,2,16,19,2,1,15,19,2,6,2,6,5,3,1,16
,4,2,1,4,9,2,1,7,13,3,1,9,15,2,2,14,17,2,2,3,3,1,240
  4500DATA16,2,19,6,9,18,2,12,19,7,5,15,10,3,13,1,6,13
,1,4,12,,15,12,1,6,11,2,9,10,2,12,11,2,6,7,1,13,7,1,3
,8,2,15,6,2,6,3,8,5,2,13,4,17,13,4,1,19,2,7,15,4,2,15
,4,6,1,5,14,5,2,14,14,5,1,8,8,3,2,11,3,3,1,5,3,3,2,14,
3,3
  4510DATA7,2,3,4,234,10,8,235
```

Canyon Assault.

```
 . 1 REM E£RND)■"; FAST SGN ■5:1
 CLEAR ,?Y■4(■4■"?Y■)/■Y■ACS ?C
■Y■?/:YU■4■C 7ACS ?C■■)/■ACS INK
EY$4" >.FY■COS 7■RNDE£RND)■ ;7YU
■4■" ■4■Q■/ LOAD ) ■.7■4 CLS Y
■COS ACS ?C■"TAN 0 F/ LET E£RND
■  Y■4"■Y■COS 7/ NEXT ........
.....
  5 GOTO 200
 10 LET M$="42.12.64.17.174.2.2
5.229.209.6.33.19.16.-3.26.79.62
.6.190.32.21.151.185.32.6.119.62
.6.18.24.0.62.136.203.07.40.2.62
.6.119.24.14."
 20 LET M$=M$+"62.59.190.32.9.4
0.0.112.203.121.40.4.151.18.24.5
.203.65.32.1.18.27.43.62.140.190
.200.195.144.64."
 30 LET M$=M$+"42.12.64.17.0.0.
25.35.62.59.190.32.3.1.1.0.151.1.
90.32.4.64.0.64.-17.17.0.10.27.1
26.179.32.-5.62.137.190.200.203.
86.40.2.11.201.54.0.43.24.-15."
 40 LET M$=M$+"42.12.64.1.0.0.6
2.136.190.32.1.8.62.3.190.200.00
.64.-13.:"
 50 LET A$=""
 60 LET X=16514
 70 FOR F=1 TO LEN M$
 80 IF M$(F)=":" THEN GOTO 190
 90 IF M$(F)="." THEN GOTO 120
100 LET A$=A$+M$(F)
110 NEXT F
120 IF PEEK X=118 THEN PRINT "E
RROR IN LINE 1";END
130 SCROLL
140 POKE X,VAL A$
150 PRINT X,PEEK X
160 LET X=X+1
170 LET A$=""
180 NEXT F
190 STOP
200 CLS
205 LET S=0
210 FOR F=0 TO 20
220 PRINT "■";TAB 26;"■
■"
230 NEXT F
240 PRINT AT 5,1;"■"
250 PRINT AT 11,4;"■"
260 FOR F=19 TO 20
270 FOR N=6 TO 25
280 PRINT AT F,N;"■"
290 NEXT N
300 NEXT F
310 FOR F=0 TO 31
320 PRINT AT 21,F;"■"
330 NEXT F
340 PRINT AT 0,0;"■"
350 REM PLAY ROUTINE
360 LET H=PEEK 16396+256*PEEK 1
6397
390 FOR T=0 TO 200
400 IF INKEY$="F" THEN GOTO 490
410 IF INKEY$<>"H" THEN GOTO 52
0
430 POKE 16590,113
440 POKE 16591,1
450 LET F=USR 16536
460 IF F=16535 THEN GOTO 600
470 IF F=1 THEN LET S=S+1
480 GOTO 520
490 POKE 16590,171
500 POKE 16591,3
510 GOTO 450
520 POKE 16562,7
530 IF RND>.2 THEN POKE 16552,0
540 LET F=USR 16514
550 IF RND>.6 THEN POKE H+(RND*
19)+7,59
560 IF RND>.6 THEN POKE H+(RND*
19)+7,8
570 NEXT T
600 LET F=USR 16633
610 CLS
620 PRINT ,,"ALIENS SHOT...";S
630 PRINT ,,"FROM 40 BARRELS YO
U HAVE ";F
640 LET N=F-40
650 IF N<0 THEN LET N=0
660 PRINT ,,"SCORE = ";N;"*5+";
S;" - ";N*5+S
670 PRINT ,,"ANOTHER GAME ? (Y/
N)"
```

(continued on page 175)

Canyon Assault

Stephen Booth, Worsbrough, Barnsley.

ZX-81

THE SCENERY is of a step-sided canyon at the bottom of which are 40 barrels of fuel. Aliens, which resemble V shapes, move down the canyon to try to destroy your fuel. To stop the aliens you have two guns in the left side of the canyon which must be aimed carefully at the aliens. If you should miss the aliens you will destroy parts of the right side of the canyon and if it is completely undermined the canyon collapses bringing down your guns with it.

Also moving down the canyon are extra barrels of fuel which should not be destroyed if a high score is to be obtained. To fire your guns all you have to do is press the F or H key depending on which guns is to be fired. There is a time limit to the game.

To provide the game with smoothly moving graphics, machine-code had to be used when graphics are being moved. However, the more machine-code used the more likely an error is to occur and the more tedious it becomes entering it, so Basic and machine-code have been used together.

The addresses are given every 10 instructions. The first section of machine-code is to scroll the right characters downward.

MAIL ORDER PROTECTION SCHEME

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, *Your Computer* will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided that:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of of *Your Computer* summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claims and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent.

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements. Classified advertisements are excluded.

(continued from page 173)

```
680 INPUT A$
690 IF A$(1)="Y" THEN RUN
899 STOP
900 LET M$="42.12.64.17.174.2.2
0.235.209.0.00.19.15.-5.25.79.62
.2.150.32.21.151.185.32.5.119.62
.2.16.24.9.62.135.223.97.40.2.62
.2.119.24.14."
902 LET M$=M$+"32.59.190.32.9.4
0.0.112.203.121.10.1.151.18.24.5
.203.65.32.1.18.27.43.52.142.190
.200.195.144.64."
908 LET X=16514
909 LET A$=""
910 LET M$=M$+"42.12.64.17.0.0.
25.35.62.59.190.32.3.1.1.0.351.1
90.32.4.54.9.24.-17.17.0.10.27.1
22.170.32.-5.62.137.190.200.200.
36.40.2.11.201.54.0.43.21.-15."
912 LET M$=M$+"42.12.64.1.0.0.6
2.136.190.32.1.3.32.3.190.200.35
.24.-13."
915 FOR F=1 TO LEN M$
920 IF M$(F)=" " THEN STOP
930 IF M$(F)="." THEN GOTO 960
940 LET A$=A$+M$(F)
950 NEXT F
960 SCROLL
963 POKE X,VAL A$
965 PRINT X,PEEK X
970 LET A$=""
980 LET X=X-1
986 IF PEEK X=113 THEN PRINT "E
RROR";XYZ
990 NEXT F
```

Apple Drop

Philip Balfe,
Rochdale,
Lancashire.

VIC-20

YOU ARE TRAPPED at the bottom of a deep shaft and your only chance of escape is to eat lots of grain or to kill the three monsters. To go on to the next level you need to eat 151 grains or push apples out into the shafts you have dug, watching them falling onto the invading creatures below.

You score 1 point for eating a grain and 500 points for killing a creature.

Use the keys: W — Up; A — Left; S — Right; Z — Down.

As you go through each screen the number of apples is smaller. Good Luck.

```
10 FORT=7168TO7231:READC:POKET,C:NEXT
20 DATA60,126,147,131,126,255,195,255
30 DATA24,24,60,90,153,36,66,129
40 DATA0,0,8,28,62,28,8,0
50 DATA112,8,8,54,127,127,127,62
60 DATA0,0,0,0,0,0,0,0
70 DATA0,0,0,0,0,0,0,0
80 DATA60,126,147,131,126,255,195,255
90 DATA60,126,147,131,126,255,195,255
100 POKE36879,136:PRINT"       APPLE DROP                "
110 PRINT"DIG TUNNELS AND PUSH  APPLES OUT INTO THE   SHAFTS YOU HAVE DUG"
120 PRINT" AND WATCH THE APPLES DROP ONTO THE INVADINGCREATURES BELOW"
130 PRINT"KILLING THEM INSTANTLY"
140 PRINT"USE THE KEYS:-"
150 PRINT"                W  A--S  Z"
160 PRINT"PRESS SPACE BAR"
170 GETA$
180 IFA$<>" "THEN170
190 PRINT"THERE ARE THREE          CREATURES WHICH YOU    MUST KILL."
200 PRINT"IF THERE ARE NOT         ENOUGH APPLES THEN EATTHE FOOD GRAINS ";
210 PRINT"AND   AVOID THE CREATURES,  THEN AFTER SOME TIME   YOU SHALL GO ONTO TH
E NEXT";
220 PRINT" SCREEN AND THE   GAME GETS HARDER."
230 PRINT"NOW LOAD PART 2":NEW
```

```
1 V1=19
10 PRINT"":POKE36869,255:POKE36879,24:R=7747:TI$="000000"
20 U=7746:J=30466:M=9:O1=1:O2=-1:O3=22:O4=-22:POKE36878,15:H1=1:F1=9:F2=9:H2=1
50 H3=1:P%=0:RB=0:TV=3:V1=V1-1
100 FORT=RTOR+19:POKET,2:NEXTT
110 R=R+22:IFR<8164THEN100
120 FORS=38466TO38906:POKES,3:NEXTS
130 FORT=7746TO8162:R=INT(RND(1)*V1)+1:IFR=2THENPOKET,3:IFR=2THENPOKE30720+T,2
135 NEXTT:R=7746
140 FORT=R+9TOR+10:POKET,4:POKE30720+T,1:NEXTT:R=R+22
150 IFR<8176THEN140
155 E=8845
160 POKEE,1:POKEE+1,1:E=E-22
170 IFE<>8054THEN160
180 FORT=38984TO38906:POKET,1:NEXTT
500 Y=10:R=8164:S=38884:POKER+Y,1:POKES+Y,4
600 L=PEEK(197)
601 IFRB>150THEN10
602 IFTV<1THEN10
605 IFTI$>"000015"ANDH1=1THENP1=1:S1=0:GOTO7900
606 IFTI$>"000020"ANDH2=1THENP1=2:GOTO9060
607 IFTI$>"000025"ANDH3=1THENP1=3:GOTO9070
609 PRINT"SCORE":SC
610 IFL=17THENF=O2
620 IFL=41THENF=O1
630 IFL=9THENF=O4
640 IFL=33THENF=O3
660 IFL<>17ANDL<>41ANDL<>9ANDL<>33THEN606
670 IFPEEK(R+Y+F)<>0ANDPEEK(R+F+Y)<>3ANDPEEK(R+Y+F)<>4ANDPEEK(R+Y+F)<>2THEN600
674 IFPEEK(R+Y+F)=3THENGOSUB5000
675 IFPEEK(R+Y+F)=8162THEN600
676 POKER+Y,4:POKES+Y,1
677 POKE36875,200:FORT=1TO30:POKE36876,0
680 Y=Y+F:IFPEEK(R+Y)=2THENRB=RB+1:SC=SC+1
700 IFPEEK(R+Y)=0THEN10000
710 POKER+Y,1:POKES+Y,4:GOTO600
1104 IFP1=3THENH3=0
1105 RETURN
5000 IFF=-22ORF=22THEN600
5010 IFF=1THENZ=1
5020 IFF=-1THENZ=-1
5030 POKER+Y+F,4:POKES+Y+F,1:POKER+Y+F+Z,3:POKES+Y+F+Z,2:IFPEEK(R+Y+F+Z+22)=4THE
N5200
5040 RETURN
5200 O1=R+Y+F+Z:DI=0:C1=255
5210 IFPEEK(O1+DI+22)=0THENGOSUB11000
5215 IFPEEK(O1+DI+22)=6ORPEEK(O1+DI+22)=7THENGOSUB11000
5220 IFPEEK(O1+DI+22)=2THENRETURN
5225 POKE36876,C1:C1=C1-1
5230 POKEO1+DI,4:POKE30720+O1+DI,1:DI=DI+22
5240 POKEO1+DI,3:POKE30720+O1+DI,2
5245 S1=O1+DI:POKE36876,0:IFS1<8185THEN5210
5250 RETURN
7900 M=P1
8000 POKEJ+M,1:POKEJ+M,1
8010 M=INT(RND(1)*4)+1
8020 IFM=1THENV=O1
8030 IFM=2THENV=O2
8040 IFM=3THENV=O3
8050 IFM=4THENV=O4
8060 IFPEEK(U+M+V)<>4ANDPEEK(U+M+V)<>1ANDPEEK(U+M+V)<>0ANDPEEK(U+M+V)<>6ANDPEEK(
U+M+V)<>7THEN8010
8070 IFPEEK(U+M+V)=1THEN10000
8080 M=M+V:POKEU+M,S1:POKEJ+M,0
8090 IFP1=1THENP1=M
9000 IFP1=2THENP2=M:GOTO607
9010 IFP1=3THENP3=M:GOTO609
9050 GOTO604
9060 M=P2:S1=6:GOTO8000
9070 M=P3:S1=7:GOTO8000
10000 PRINT"    YOUR DEAD!!!"
10001 PRINT" AND YOU SCORED"
10002 PRINT"     ";SC" POINTS"
10005 V=36875
10010 READP:IFP=-1THEN10050
10020 POKEV,P:READD:FORT=1TOD:NEXT:POKEV,0:GOTO10010
10050 PRINT"      AGAIN?(Y/N)"
10060 [illegible]
10070 IFA$<>"N"THEN10060
10080 END
11000 FORT=128TO255:POKE36874,T:NEXTT:POKE36874,0
11001 POKER+Y+F+22,4:POKES+Y-F+22,1:SC=SC+500:TV=TV-1
11002 IFPEEK(O1+DI+22)=0THENH1=0
11003 IFPEEK(O1-DI+22)=6THENH2=0
11004 IFPEEK(O1+DI+22)=7THENH3=0
11005 RETURN
20000 DATA195,600,0,30,195,400,0,30,195,200,195,800,0,90
20010 DATA[illegible]
20020 DATA195,600,0,30,195,200,0,90,195,1000,-1
```

Keywords

Julian Randell,
Thurmaston,
Leicester.



WHEN I FIRST saw the Electron, I was interested in the use of the function key — func — as a means of obtaining Basic commands. I therefore decided to implement this idea on my BBC.

Listing 1 is the completed program which can be assembled and then used as a stand alone machine-code program. The actual machine-code only takes up two pages of valuable user memory — 512 bytes. Before program entry can begin you must first type:

MODE 7:PAGE = &3000

and then type New. Then listing 1 can be typed in; comments and remarks can be left out of course. Then the Basic program should be saved as:

SAVE "KEYWORDS"

This operation is imperative, as the program alters operating system entry points and uses interrupts. Hence it will completely lock up the machine if there is a typing error.

(continued on next page)

(continued from previous page)

Run the program and if all is well the program will report its Execution address. This should then be called. The computer should resert by itself with the message.

Keyword extension (C) J.P.R.

If this does not happen reload from tape and check the program through. The program is then used by pressing Tab, releasing it and pressing the required key as below:

X — MOVE   I — INPUT   R — RUN
A — AUTO   J — SAVE   S — STEP
B — DEF   K — CHAIN   T — THEN
C — COLOUR   L — LIST   U — UNTIL
D — DRAW   M — MODE   V — VDU
E — ELSE   N — NEXT   W — RESTORE
F — FOR   O — OLD   X — PROC
G — GOTO   P — PRINT   Y — REPEAT
H — LOAD   Q — LOCAL   Z — END

I use the program quite often and have stuck these keywords to the front of the respective keys on the keyboard. Finally, to save the program as machine-code only, for users without a disc-drive type:

*SAVE "KEY.M.C." E00 1FF E7C

The program can be easily run at different addresses by altering the value of Mem in line 60. This must not be set to below &E00. For example, for disc users, type:

60 MEM = &1900

To save as machine code, return the program and then type:

*SAVE "KEY.M.C." 1900 1AFF 197C

Page will be set to &200 above the base address on Break or Ctrl Break.

Listing 1.

```
   10 REM ********************************
   20 REM **   Keyword extension V 1.2  **
   30 REM **   As found on Electron     **
   40 REM **   (c) J.P. Randell         **
   50 REM ********************************
   60 MEM=&E00:REM & CHANGE &E00 TO YOUR REQUIRED BASE
 ADDRESS
   70 BASE=MEM+&100:PROG=MEM+&101:KWFG=MEM:MSFG=MEM+1
   80 FOR PASS=0 TO 3 STEP 3
   90 P%=PROG
  100 [ OPT PASS
  110 .event              \keyboard event redirected her
e
  120        PHP          \save registers
  130        PHA
  140        TXA:PHA
  150        TYA:PHA
  160        LDA KWFG
  170        CMP #&FF     \check keyword flag (FF=on)
  180        BEQ KEWD
  190        CPY #0       \tab key?
  200        BNE QUIT
  210        LDA #&FF     \set keyword flag
  220        STA KWFG
  230 .QUIT  PLA:TAY      \reload reg's from stack
  240        PLA:TAX
  250        PLA:PLP
  260        RTS
  270
  280 .KEWD               \insert whole keyword into buf
fer
  290        LDA #0       \reset keyword flag
  300        STA KWFG
  310        CPY #64      \smaller than ASC "A" ?
  320        BMI QUIT
  330        CPY #91      \bigger than ASC "Z" ?
  340        BPL QUIT
  350        TYA
  360        SEC
  370        SBC #64      \make range of values 1-26
  380        TAY
  390        LDA BASE,Y   \get offset of keyword
  400        TAY
  410        LDX #0       \X is keyboard buffer
  420 .NTCR  LDA BASE,Y   \get keyword chr$
  430        CMP #0       \is end of keyword
  440        BEQ DONE
  450        STY MEM+2    \save Y
  460        TAY
  470        LDA #&99     \osbyte &99 insert chr$
  480        JSR &FFF4    \into keyboard buffer
  490        LDY MEM+2    \restore Y
  500        INY
  510        BNE NTCR     \Y never zero
  520 .DONE  LDA #&FF     \set miss next chr$ flag
  530        STA MSFG
  540        JMP QUIT
  550
  560 .INSV               \buffer insert vector redirect
ed here
  570        PHP
  580        PHA
  590        CPX #0       \keyboard buffer?
  600        BNE NORM
  610        LDA MSFG     \miss character flag
  620        CMP #&FF     \set ?
  630        BNE NORM
  640        PLA
  650        LDA #0
  660        PHA          \make A reg's value on stack 0
  670        STA MSFG
  680 .NORM  PLA
  690        PLP
  700        JMP &E4B3    \back to O.S's INSV routine
  710
  720 .BRIN               \initialise BREAK intercept co
de
  730        LDA #247
  740        LDX #&4C
  750        LDY #0
  760        JSR &FFF4    \FX 247,76
  770        LDA #248
  780        LDX #INIT MOD 256
  790        LDY #0
  800        JSR &FFF4    \points to init routine on bre
ak (low byte)
  810        LDA #249
  820        LDX #INIT DIV 256
  830        LDY #0
  840        JSR &FFF4    \points to init routine on bre
ak (high byte)
  850        JMP (&FFFC)
  860
  870 .INIT               \re-initialise routine
  880        JSR WAIT     \wait till reset message print
ed
  890        LDA #0
  900        STA MSFG
  910        LDA #180
  920        LDX #(MEM DIV 256)+2
  930        LDY #0
  940        JSR &FFF4    \set USER (PAGE) to &1000 on
BREAK
  950        LDA #219
  960        LDX #0
  970        LDY #0
  980        JSR &FFF4    \set TAB key to ascii 0
  990        LDA #&14
 1000        STA &220
 1010        LDA #MEM DIV 256
 1020        STA &221     \event vector set
 1030        LDA #INSV MOD 256
 1040        STA &22A
 1050        LDA #INSV DIV 256
 1060        STA &22B     \INSV vector set
 1070        LDA #14
 1080        LDX #2
 1090        JSR &FFF4    \switch on keyboard event
 1100        LDX #0       \print sign on message
 1110 .LOOP  STX MEM+5    \save X reg
 1120        LDA MEM+&1D0,X
 1130        JSR &FFEE
 1140        LDX MEM+5    \get X reg
 1150        INX
 1160        CPX #31
 1170        BNE LOOP
 1180 .NEXT  RTS          \enter BASIC
 1190 ]:NEXT
 1200 POKE=BASE+28
 1210 TB=BASE-1
 1220 REPEAT
 1230 READ A$
 1240 IF A$="*" THEN TB=TB+1:?TB=((POKE MOD 256)+1):P
OKE=POKE:GOTO1270
 1250 IF A$="+" THEN ?POKE=13:GOTO1270
 1260 ?POKE=ASC(A$)
 1270 POKE=POKE+1
 1280 UNTIL A$="!"
 1290 $(MEM+&1D0)="Keyword extension (C) J.P.R."
 1300 MEM?&1CE=10:MEM?&1CF=10
 1310 PRINT"EXEC ADDRESS = &";~BRIN:END
 1320DATA *,M,O,V,E,*,A,U,T,O,*,D,E,F,*,C,O,L,O,U,R,*,
D,R,A,W,*
 1330DATA E,L,S,E,*,F,O,R,*,G,O,T,O,*,L,O,A,D,*,I,N,P,
U,T,*
 1340DATA S,A,V,E,*,C,H,A,I,N,*,L,I,S,T,*,M,O,D,E,*,N,
E,X,T,*
 1350DATA O,L,D,+,*,P,R,I,N,T,*,L,O,C,A,L,*,R,U,N,+,*,
S,T,E,P,*
 1360DATA T,H,E,N,*,U,N,T,I,L,*,V,D,U,*,R,E,S,T,O,R,E,
*,P,R,O,C,*
 1370DATA R,E,P,E,A,T,*,E,N,D,*,!
```

Showdown

Paul Williams, Yarnton, Oxford.

SPECTRUM

THIS PROGRAM for two players was written on a 48K Spectrum but will run on the 16K model as well. The idea of the game is to kill the other player in a good old-fashioned Western gunfight. The players are at either side of the screen and move smoothly up and down using these keys:

Left player
Q — Up
A — Down
Z — Fire
Right player
P — Up
L — Down
Symbol Shift — Fire

Each player has five lives and unlimited bullets and you may fire and move at the same time but you can only have one bullet on screen at a time.

When you have a working version save it using

SAVE "SHOWDOWN" LINE 1

This will give automatic running on loading. The letters in speech marks in line 1040 are graphics A, B, C and D. To speed the game up, use Poke 31364, n where n is the required speed — 1 is lightning and the higher the number the slower the game.

```
   1 REM SHOWDOWN
   5 POKE 23693,71: BORDER 0
  10 CLEAR 30999
  12 RE AUR AAAA
  14 RESTORE
  15 PRINT AT 21,0; INK 6; PAPER
 1; FLASH 1;"  Please wait - Set
ting up data"
  20 LET a=10: LET b=11: LET c=1
2
  30 LET d=13: LET e=14: LET f=1
5
  40 LET a$="": LET n=31000: LET
 t=0
  50 IF a$="" THEN READ a$: IF a
$="=" THEN GO TO 100
  60 LET z=16*VAL a$(1)+VAL a$(2
)
  70 LET t=t+z: POKE n,z
  80 LET a$=a$(3 TO )
  90 LET n=n+1: GO TO 50
 100 IF t<>72781 THEN PRINT "ERR
OR IN DATA": BEEP 2,-10: STOP
 120 GO TO 1000
 200 DATA "F33E02CD0116211000225
27B2184783AF3285783287783E0532B37
E128F7B2AB27BCD277B11907BCD"
 210 DATA "5F7B01FEFBED78E61FFE1
F2802A827B2D2E08ED2D1DEC181F01F
EFDED73E61FFE1F2800C2A827B2C"
 220 DATA "3EA8BD200620180328527
B22827BCD277B1187B7BCD5F7B2A847B2
DE77511E00E11907BCD5F7B01"
 230 DATA "FEDFED78E61FFE1F2800E
AE47B2D0ED08ED201D2C181A01FEBFED7
8E61FFE1F2800CA847B2C3EF8BD"
 240 DATA "2000ED1C002AC47D2204
7BCD277B111E001911E47BCD5F7B3A857
BB723D001FEFEED78E61FFE1F28"
 250 DATA "1828A27E3E0AE55F2286
7D0E0D28007D2800782F007BCD27783A8
C7B5F16001936003A8C7B3CFE20"
 260 DATA "2005AF3286B7B151A32807
3237EB72B10AF3286E7E3A8C7BFE1ED2C
C7A3600180236FF3A8778B72C10"
 270 DATA "01FE7FED78E61FFE1F284
32A8478E3E0A866F225F7B3E1D3280783
2877B2A8A7BCD277B3CF8D7B5F1B"
 280 DATA "001936003A8D7B3DFEFF2
006AF32877B18193280D7B287EB7280FA
F328778B3A8D7BFE023613360013"
 290 DATA "0205FF060FC05060010FEC
110F8C03267928827BCD277B110E7CCD5
F7B3A887B30326827820E18D7"
 300 DATA "3E030739E0807A8E7BC53
0D7CD127B2A827BCD277B11907BCD5F7
B21100022527BCD3E7924A847BCD"
 310 DATA "277B111E00191105E7CCD5
F7B3A887B3D0AAF7A8A8B3F1AD73E00D
73E1FD73A8F7B0D3B0D7CD127B2A84"
 320 DATA "7BCD277B111E0019119 07
BCD5F7B211000228178C3387 9F8C9210
0021105002C0E8ED5C0D8503C1"
 330 DATA "01E12010F40C5D5F444D2
1C0407E6271E00571079E53F18005F7
9E5F6E526306F1916005 9ED5229"
 340 DATA "2EEBE191100007 9E6C05
FEB2929292929 2EB19D1C10900151A772
0131A77202413 70E6072 01070C8"
 350 DATA "09677DC5206FE6E020047
CC50 9571CEC0 900000000000000000
0000000000000000000000000"
 360 DATA "00000000000000000000
00000000000000000000000000000000000
0000000000000007800780 1FE006"
 370 DATA "300 7000780030007 820FC
01FC03FEF37F83F801F800F0007C00C
006C00EC01C0 18F001E001E007"
 380 DATA "F80 16003E001E0000C01E
00 3F003F8F 701F 8000F001F8030F0 0 3E
003E030030030 7007380F13000000"
 390 DATA "00000003C007E00FF00FF
03FF03E7C3E7C3E7C3E7C300C300C3E7C3E7
C3E7C3E7C3E7C3E7C3FFC3FFC00"
 400 DATA "="
1000 CLS : FOR n=1 TO 20: LET a=
22523+32*n: POKE a,67: POKE a+1,
67: POKE a+30,69: POKE a+31,69:
NEXT n
1020 FOR n=1 TO 4
1030 LET y=INT (RND*20)+1: LET x
=INT (RND*20)+6
1040 PRINT INK 4; AT y,x;"AB";AT
y+1,x;"CD": NEXT n
1050 PRINT AT 0,0;"LIVES 5";TAB
25;"LIVES 5"
1060 LET z=USR 31000: LET z=USR
31504
1070 IF PEEK 31531=0 THEN PRINT
AT 0,10;"PLAYER 1 WINS": GO TO 1
090
1080 PRINT AT 0,10;"PLAYER 2 WIN
```

```
s"
1090 PRINT AT 21,0;"Do you want
to play again? (Y/N)"
1100 IF INKEY$="Y" OR INKEY$="y"
 THEN GO TO 1000
1110 IF INKEY$<>"N" AND INKEY$<>
"n" THEN GO TO 1100
1120 CLS : STOP
9000 RESTORE 9010: FOR n=0 TO 31
: READ a: POKE USR "a"+n,a: NEXT
 n
9010 DATA 0,0,1,1,1,9,15,13,64,2
24,240,176,240,240,240,176
9020 DATA 7,7,7,2,3,1,1,31,240,2
40,240,240,224,192,192,248
9100 CLS : PRINT PAPER 1;TAB 31;
TAB 8;"S H O W D O W N";TAB 31;"
 ";TAB 31;" "
9110 PRINT AT 5,0; INK 3;"LEFT P
LAYER";AT 5,20;"RIGHT PLAYER"
9120 PRINT AT 7,1;"Q - UP";AT 7,
24;"P - UP"
9130 PRINT AT 9,1;"A - DOWN";AT
9,24;"L - DOWN"
9140 PRINT AT 11,1;"Z - FIRE";AT
 11,15;"SYM. SHIFT - FIRE"
9170 RETURN

A=  B=  C=  D=
```

Cosmic Dodger

Philip Massam,
Derwen Fawr,
Swansea.

ORIC

DURING THE YEAR 2024 it was found that Coal Board estimates that coal reserves would last for 300 years found to be a slight overestimate — by about 280 years. In the panic that ensued on earth many people suddenly started to look into the feasibility of alternative energy or ways to conserve energy. One idea put forward to conserve energy was to remove all the habit forming electronic devices commonly known as arcade machines. However, mass picketing of major computer installations by the USI — Union of Space Invaders — caused this policy to be abandoned.

At about this time one of NASA's earlier space probes launched from the shuttle in the year 1997 was circling Mars. The space probe reported that there were landing pads on the surface of the Red planet and that these pads were formed out of a certain black fossil fuel commonly known as coal. This news was greeted with great joy back on earth, unlike the news that the Red planet was orbited by many asteroids some moving some stationary.

The space probe gave no indication as to whether or not Mars was inhabited. Relying on the Viking Mars probes sent in the 1970s, NASA was prepared for no inhabitants and designed and built a Mars lander and a mother ship to land on these pads and bring back the coal.

In 2031 the entire spaceship was launched from NASA orbiting space station Ron 1 and reached Mars in 3½ months and landings began. The landings began in a sector with seven pads and one by one the pads were used up until finally the last pad was taken and the lander returned to the orbiter. Then, to everyone's surprise, all seven pads reappeared on the Mars surface and some of the asteroids that had previously been stationary started to move.

In this game for the Oric you must drop from the orbiting flying saucer down through the asteroids on to the pads on the surface of Mars when you have raised the flag signifying a successful landing the pad will disappear leaving you with the task of returning into the flying saucer.

On the first sheet this not too difficult because none of the asteroids move but as soon as all seven pads are used up then landing bonus is awarded along with an unused fuel bonus. Then the second sheet will appear and even the least observant will notice that two of the rows are moving. When this sheet has been completed the relevant bonuses will be awarded and then the third sheet will start which has four rows of moving asteroids and the fourth sheet which has six rows of moving asteroids. After this sheet no more rows of asteroids move but the number of asteroids per row is incremented by one so that six rows move but every sheet has more asteroids than the one before.

There is also a bonus for actually landing on the pads themselves and this bonus is proportional to the length of the pad landed on. The scores awarded are: A pad four sections long = 300 points; A pad six sections long = 200 points; A pad eight sections long = 100 points.

This is due to the fact that the longer a pad is, the easier it is to land on. The landing bonus awarded at the end of each sheet is for the number of completed flights multiplied by 100 points. A completed flight is the whole round trip down from saucer to pad and back up to the saucer.

To make your flights slightly easier there is a thrust facility which will hold the landing craft in the sky in its current position. However, this uses fuel of which you only have a limited amount — 1500 units per sheet but the thrust uses 10 units per burn. This feature is most useful in avoiding the moving asteroids and its use is essential when there are six rows of asteroids moving.

```
 0 HIMEM#1E00:HS$="00000":DIMHS(5):PCK
E618,10:JK=2
 1 GOSUB5000:GOSUB1800
 2 GOSUB4500:GOSUB1800
 3 GOSUB4000
 5 GOSUB4000:GOTO10
 6 IFFU=0THEN9 ELSE FU=FU-10
 7 P=P-I:D=D+.4*-I
 9 F$=STR$(FU):PLOT33,1,F$+" ":RETURN
 10 P=P+I:DOKEE,8224:CALL#2000
 20 IFDEEK(P)<>8224THENGOTO1000
 30 DOKEP,#6D6A
 35 E=P:D=D+.4*I:PLAY0,1,1,D*2*SGN(8)
 40 J=PEEK(520):IFJ=170THENP=P-1
 50 IFJ=176THENP=P+1
 70 IFJ=153THENGOSUB6
 80 GOTO10
 1000 R=DEEK(P)
 1005 IFDEEK(P)=26471THEN2000
 1010 IFR=24930ORR=24929ORR=25441THEN1
500
 1015 DOKEF,#6B6A
 1020 FORX=1TO3:FORX1=46928TO46943:PCK
EX1,INT(RND(1)*63)+1
 1025 PLAYC,7,4,PEEK(X1):NEXT:EXPLODE:
NEXT
 1030 DOKEF,R:PLAY7,0,0,0
 1032 FORD=1TO38:PLOTD,3," ":NEXT
 1035 SOUND1,0,0:D=0
 1100 LI=LI-1:IFLI=0THEN1300
 1110 PLOTLI*2,1,"  "
 1120 FORX=46896TO46903:POKEX+32,PEEK(
X):NEXT
 1130 FORX=46912TO46919:POKEX+24,PEEK(
X):NEXT
 1132 IFLI=0THENRETURN
 1140 GOTO2
 1300 REM @@
 1302 HP=3
 1305 GOSUE1120
 1310 PLOT10,10,"    GAME OVER"
 1315 WAIT200:CLS
 1320 IFSC>HS(5)THENPLOT10,12,"YOU HAV
E A HIGH SCORE":GOSUB3000
 1325 PRINTCHR$(30);:GOSUB3040
 1330 IFHP=0THENPLOT10,12," THE TOP HI
GH SCORE  "
 1340 GOSUB1400
 1345 H=0:JK=2:SC=0
 1350 PLOT10,14,"  PRESS 1 TO PLAY !
"
 1355 FORX=1TO4:POKEK(X),96:NEXT
 1360 GETJ$
 1370 IFJ$="1"THEN2
 1390 GOTO1360
 1400 HS$=STR$(HS(1))
 1405 U=LEN(HS$)
 1410 ICFU<6THENHS$="0"+HS$:GOTO1405
 1420 RETURN
 1499 END
 1500 P=P-40:PULLP,#6B6A
 1502 PLAY1,0,4,200
 1505 E=P
 1510 POKEP-40,109
 1520 FORX=46955TO46952STEP-1
 1525 MUSIC1,4,X-46951,0
 1530 POKEX,C(X-46951):WAIT10:NEXT
 1540 FORX=46952TO46959
 1545 MUSIC1,3,X-46951,0
 1550 POKEX,0:WAIT10:NEXT
 1560 L=P+40
 1570 IFPEEK(L)=1THEN1590
 1580 REPEAT:L=L-1:UNTILPEEK(L)=1
 1590 U=L:POKEP-40,32
 1600 REPEAT:POKEL,32:L=L+1:UNTILPEEK(
L)<90
 1601 LA=LA+1
 1603 SC=SC-300*((L-U)=5)-200*((L-U)=7
)-100*((L=U)=9):PLOT24,1,STR$(SC)+" "
 1605 M=PEEK(U-1):IFM=101ORM=100THEN16
10ELSE1700
 1610 REPEAT:POKEU,INT(RND(1)*2)+100
 1620 U=U+1:UNTILPEEK(U)>100
 1700 I^-40:GOTO10
 1800 LA=0:LI=4:LY=0:SC=0
 1805 FU=1500:H=0
 1810 RETURN
 2000 LY=LY+1:IFLA=7THEN2050
 2010 FORD=1TO38:PLOTD,3," ":NEXT
 2020 GOTO5
 2050 FORX=4TO21:PLOT9,X,"
     ":NEXT
 2055 PLOT10,10," SHEET COMPLETED"
 2060 PLOT10,12,"COMPLETED FLIGHTS"
 2070 PLOT18,14,STR$(LY)
 2080 PLOT10,16,"   BONUS="+STR$(LY*10
0)
 2090 SC=SC+LY*100
 2095 H=H+1:IFH>3THENJK=JK+1:GOTO2100
ELSE POKEK(H),234
 2100 IFFU<11THEN2160
 2105 PLAY0,1,3,200
 2110 REPEAT:FU=FU-20
 2120 SC=SC+30
 2130 PLOT33,1,STR$(FU)+" "
 2140 PLOT24,1,STR$(SC)+" "
 2150 UNTILFU<=0
 2160 LA=0:LY=0:FU=1500
 2170 PLAY1,0,0,0
 2180 SOUND1,400,10:WAIT30:SOUND1,800,
10:WAIT30:SOUND1,600,10:WAIT30
 2190 SOUND1,1000,10:WAIT50:GOSUB4500
 2195 SOUND1,0,0:GOSUB4000
 2200 SOUND1,0,0:GOTO5
 3000 HP=5:HS(5)=SC
 3010 REPEAT
 3015 ST=0
 3020 IFHP<> 1 THEN IF HS(HP-1)<SC THE
N HS(HP)=HS(HP-1):HS(HP-1)=SC:ST=1
 3025 HP=HP-1
 3030 UNTILST=0
 3040 FORX=1TO5:PRINT"            ";X".
",HS(X)
 3050 PRINT:NEXT
 3060 RETURN
 3999 END
 4000 A$=" bggc ":B$=" bjkc "
 4001 IFLA=7THENPOP:GOTO2050
 4002 POKE46928,63:POKE46935,63:POKE46
936,63:POKE46943,63
 4003 PLAY1,0,4,200:SOUND1,600,0
 4005 X=17:Y=3:G=1:J$=KEY$
 4008 IFRND(1)>.5THENG=-1
 4010 PLOTX,Y,B$:I=40
 4015 E=48922
 4020 X=X+G:IFX=33THENG=-1
 4030 IFX=1THENG=1
 4040 J$=KEY$:IFJ$="F"THEN4100
 4050 CALL#2000:WAIT3:GOTO4010
```

(continued on page 179)

(continued from page 177)

```
4,5:POKE49053,5
 4670 POKE49057,1:POKE49016,1:POKE4897
 4100 POKE46928,0:POKE46935,16:POKE469
36,0:POKE46943,2
 4120 P=48162+X-2*(G=-1)
 4125 CALL#2000
 4130 J$=KEY$
 4135 IFK=1THENG=-1
 4136 IFK=33THENG=1
 4140 PLOTX-G,Y,A$
 4145 PLAY1,0,6,30:SOUND1,300,0:SOUND2
,0,0:SOUND3,0,0
 4150 RETURN
 4499 END
 4500 CLS
 4505 PLAY7,0,0,C
 4510 A$="111111111111111111111111111111
1111111111"
 4520 PLOT1,2,A$:PLOT1,26.A$
 4530 A$="baaaaaac":B$="baaaac":C$="ba
ac'
 4540 PLOT5,24,A$:PLOT6,25,B$:PLOT15,2
3,A$:PLOT16,24,B$:PLOT17,25,C$
 4550 PLOT29,21,E$:PLOT30,22,C$
 4560 W$="deeed":PLOT12,25,W$:Q$=CHR$(
127)+CHR$(127):PLOT1,25,Q$
 4570 PLOT1,24,"de":PLOT3.25,"eed"
 4580 PLOT27,25,G$+Q$+Q$+Q$:PLOT29.24.
Q$+Q$:PLOT31,23,G$
 4590 PLOT24,25,CHR$(127):PLOT24,24,"e
":PLOT21,25,"ede"
 4600 PLOT25,25,"dd':PLOT27,24,'ed":PL
OT29,23,"ee":PLOT33,24:"d ":PLOT34,25,
W$
 4610 PLOT1,1," fhfhfh  00000  DODGER
 0000    1500  "
 4630 PRINTCHR$(30);"  SHIP   HIGH   C
OSMIC  SCORE   FUEL  "
 4635 PRINTCHR$(30);"  SHIP    ";CHR$(1
0):HS$
 4636 PLOT24,1," 000":IFSC=0THEN4640
 4640 POKE48104,12:POKE48:12,B
 4650 POKE48121,4:POKE49081,4
 4660 POKE49046,1:POKE49005,1:POKE4901
5.1:POKE48984.5:POKE49023.5:POKE49062.
5
 4680 POKE48950,1:POKE48909,1:POKE4891
6,7:POKE48955,7
 4690 POKE49041,5:POKE49001,5
 4700 FORX=6TO17:U=0:REPEAT
 4710 U=U+1:POKE48042+(X*40)+INT(RND(1
)*36)+1,105
 4711 IFX/2=INT(X/2)THENPOKE 48041+(X*
40),2 ELSE POKE 48041+(X*40),4
 4712 UNTILU=JK:NEXT
 4715 RETURN
 4800 IFLI=4THEN4900
 4810 U=3:REPEAT
 4820 PLOTU*2,1,"  ":U=U-1
 4830 UNTILU+1=LI
 4900 RETURN
 4999 END
 5000 Y=46055:PAPER0:INK7
 5001 GOTO5010
 5003 CLS:PLOT13,11,"COSMIC DODGER"
 5004 PLOT11,13,"'1984  P.S.MASSAM"
 5005 PLOT11,15,">PRESS 1 TO PLAY<"
 5009 RETURN
 5010 REPEAT:READA:IFA=999THEN5050
 5020 Y=Y+1:POKEY,A
 5050 UNTILA=999:GOTO5160
 5060 DATA0,63,33,45,45,45,33,63
 5070 DATA0,3,15,63,63,15,3,0
 5080 DATA0,08,60,63,63,60,48,0
 5090 DATA0,2,2,34,34,34,63,63
 5100 DATA0,0,4,4,20,20,20,63
 5110 DATA0,7,9,12,2,7,9,16
 5120 DATA12,51,0,0,0,0,0,0
 5130 DATA0,56,36,12,16,56,36,2
 5135 DATA0,14,13,54,51,23,12,0
 5140 DATA0,7,9,12,2,7,9,16
 5150 DATA0,56,36,12,16,56,36,2
 5152 DATA63,51,45,30,30(45,51.63
 5155 DATA999
 5160 REM
 5255 POKE48035,0
 5270 FORX=1TO8:READB:C(X)=B:POKEI+469
51,0:NEXT
 5280 DATA0,0,15,15,15,1,1,1
 5390 F=-1
 5395 H=1
 5400 REPEAT:READA:F=F+1:POKE#2000+F,A
 5410 IFA=#60THENK(H)=#2000+F:H=H-1
 5420 UNTILA=#99
 5490 DATA#60
 5500 DATA#A2,#00,#AD,#DA,#BD,#8D,#00,
#04,#BD,#DB,#BD,#9D,#DA,#BD,#E8
 5510 DATA#E0,#26,#D0,#F5,#AD,#13,#04,
#8D,#BA,#BD,#20,#00,#21
 5520 DATA#A2,#25,#AD,#AF,#BD,#8D,#00,
#04,#BD,#B7,#BD,#9D,#BA,#BD,#CA
 5530 DATA#E0,#00,#D0,#F5,#AD,#13,#04,
#8D,#FF,#BD,#20,#00,#21,#60
 5540 DATA#A2,#00,#AD,#3A,#BD,#8D,#00,
#04,#BD,#3B,#3D,#9D,#3A,#BD,#E8
 5550 DATA#E0,#26,#D0,#F5,#AD,#13,#04,
#8D,#5F,#BD,#20,#00,#21
 5560 DATA#A2,#25,#AD,#4F,#BC,#8D,#00,
#04,#BD,#29,#3E,#9D,#2A,#BE,#CA
 5570 DATA#E0,#00,#D0,#F5,#AD,#13,#04,
#8D,#2A,#BE,#20,#00,#21,#60
 5580 DATA#A2,#25,#AD,#0F,#BD,#8D,#00,
#04,#BD,#E9,#3C,#9D,#EA,#BC,#CA
 5590 DATA#E0,#00,#D0,#F5,#AD,#13,#04,
#8D,#EA,#BC,#20,#00,#21
 5600 DATA#A2,#00,#AD,#7A,#BE,#8D,#00,
#04,#BD,#73,#3E,#9D,#7A,#BE,#E8
 5610 DATA#E0,#26,#D0,#F5,#AD,#13,#04,
#8D,#9F,#BE,#20,#00,#21,#60
 5615 DATA#99
 5650 F=1:REPEAT:READA:IFA=#99THEN5660
 ELSE POKE#2100+F,A
 5660 F=F+1:UNTILA=#99
 5700 DATA#A2,#15,#BD,#FF,#03,#9D,#00,
#04,#CA,#E0,#00,#DC,#F5,#A9,#20
 5710 DATA#8D,#00,#04,#60,#99
 5720 FORX=#400TO#413:POKEX,32:NEXT
 5723 GOSUB5003
 5725 GETP$:IFP$<>"1"THEN5725
 5730 RETURN
 5800 REM
 5810 REM  C O S M I C   D O D G E R
 5820 REM
 5830 REM  BY PHILIP MASSAM  ' 1984
```

Carnival

Drew Marshall,
Radcliffe-on-Trent,
Nottingham.

DRAGON

CARNIVAL is a game in which you must use good shooting combined with good tactics. You must shoot all the busy creatures while treating the devious bullet eating eggs with a blast from the trusty canon and also keeping your bullet tally high.

The game runs in roughly 3K on a Dragon 32. It is totally 6809 coding and should also run on a 64. It is not position independent and therefore will not run on a 16K colour machine.

Keys to use are: −Left; X-Right; Enter — Fire.

The game is fairly slow, but this is because of the bit "rolled" graphics. You may find that you have to hold the fire key down for a while to shoot as the canon must be armed.

To appreciate the game fully, a colour tv would be required as some colour mixing is done to produce some purple effects for the alien creatures.

The ducks and aliens are worth 100 points, the 10 and 5 are worth that number of bullets and a small score. If bonus is spelt correctly, and if you have been quick at clearing the screen and not let too many eggs land then you are awarded extra points. To make certain of this bonus it is best to shoot b,o,n,u,s in sequence at the end of the round. Each egg that lands eats away five bullets. Once you have used all bullets your game is over and to restart you must press the space-bar.

To add this game to your collection, first type in the whole Basic program which Pokes in the machine code. Then save this to tape using

CSAVE

Next run the program and if no errors have occured save the machine code file using

CSAVEM"CARNIVAL",&H6000,&H60A8,&H60B0

If the prospect of all that typing is too much, a cassette version will be supplied along with the assembly if required for £3.50. Make cheques to: D.C. Marshall, 12 Yonge Close, Radcliffe-on-Trent, Nottingham NG12 2EE.

The assembly runs on a dasm 2.00 but can be listed with no extras. Please say if you want assembler.

```
10 REM HEXLOADER - ENTER THE
20 REM STRING OF HEX DIGITS FIRST
30 REM AND THEN THE CHECKSUM
40 PRINT "ENTER START ADDRESS ";:INPUT START
50 PRINT "ENTER FINISH ADDRESS";:INPUT FINISH
60 FOR N = START TO FINISH STEP 8
65 PRINT N;": ";
70 TT=0:INPUT A$:Z=0
80 FOR G=1 TO LEN(A$) STEP 2
90 P=VAL("&H"+MID$(A$,G,2))
100 TT=TT+P:POKE (N+Z),P
110 Z=Z+1:NEXT
120 PRINT " = ";
130 INPUT T$
150 IF VAL(T$)<>TT THEN PRINT "ERROR - ENTER LINE AGAI
N":GOTO 70
160 NEXT

24576 : FF00FF00FF00FF00 = 1020
24584 : FF00585858205858 = 727
24592 : 5820585858205858 = 592
24600 : 5820582058205820 = 480
24608 : 5858582058202058 = 536
24616 : 2020205820582058 = 424
24624 : 2058205820582058 = 480
24632 : 2058205820582058 = 480
24640 : 2058202058202020 = 368
24648 : 5858582058582020 = 536
24656 : 5820582058205820 = 480
24664 : 5820585858205820 = 536
24672 : 2058202020582058 = 424
24680 : 2058205820582058 = 480
24688 : 2058205820582058 = 480
24696 : 2058205820205858 = 480
24704 : 5820582058205820 = 480
24712 : 5820582058205820 = 480
24720 : 2058202058205820 = 424
24728 : 58585800FF00FF00 = 774
24736 : FF00FF00FF00FF00 = 1020
24744 : FF00FF00FF00FF00 = 1020
24752 : BD6748BD670DBD66 = 960
24760 : D9BD6608BD617EBD = 1117
24768 : 6247BD645DBD6247 = 909
24776 : BD65BDBD64EDBD65 = 1295
24784 : BDB660AAB10127DB = 1025
24792 : B10227DABD6102BD = 865
24800 : 6129BD62AB20D539 = 898
```

(continued on next page)

(continued from previous page)

```
24808 : 343610BC1E002410 = 344
24816 : 10BC05FF250AE680 = 821
24824 : E7A431AB204A26EA = 990
24832 : 35B6B660AE1026A0 = 901
24840 : 57BE01128C01F410 = 697
24848 : 25A04DB601B760AE = 862
24856 : 10BE16A2BD9772B6 = 978
24864 : 011831A610BF60AC = 715
24872 : 39B660AE1027A030 = 772
24880 : 8E691710BE60AC86 = 878
24888 : 0BBD60E86FABE031 = 1077
24896 : AB2010BF60ACA6A9 = 1010
24904 : 01401027A012B660 = 576
24912 : 0080058196102202 = 464
24920 : 96B7600031ABE0BE = 1012
24928 : 694FB60BBD60E87F = 970
24936 : 01127F01137F60AE = 563
24944 : 39B660AF10269FEB = 955
24952 : B601B760AF398E69 = 893
24960 : 2F10BE60018610BD = 689
24968 : 60E8BE609BCC0000 = 973
24976 : FD609FFD60A1B760 = 1297
24984 : 438C271025093089 = 589
24992 : D8F07C609F20F28C = 1249
25000 : 03E82D093089FC18 = 750
25008 : 7C60A070F28C0064 = 894
25016 : 2D0830B89C7C60A1 = 774
25024 : 20F38C000A2D0730 = 525
25032 : 167C60A720F4BC00 = 820
25040 : 002707301F7C60A3 = 508
25048 : 20F48E609FCE0000 = 879
25056 : A680BD61FC8C60A4 = 1216
25064 : 26F62021108E69DF = 835
25072 : C61034023D31A835 = 602
25080 : 0234308E06201F30 = 361
25088 : 308B33421E128610 = 502
25096 : BD60E835B0BE1BB0 = 1043
25104 : 6F80BC1E0026F7B6 = 878
25112 : 6000B146222610BE = 525
25120 : 1B80BE690FB10027 = 585
25128 : 1434028608ED60EE = 733
25136 : 3502312110BC1BAC = 480
25144 : 27044A20EB39108E = 596
25152 : 1CA02CF616C1A8BE = 799
25160 : 01508B6FFA7E0BC01 = 906
25168 : 6026F9BD80C61027 = 761
25176 : 9F06B15A270B815E = 651
25184 : 2728B10D1027FF09 = 540
25192 : 398E694F10BE6001 = 686
25200 : 10BC192010279EEE = 658
25208 : B610BD60EB313F10 = 795
25216 : BF60018E692FBD60 = 867
25224 : E8398E694F10BE60 = 917
25232 : 01108C193E10279E = 457
25240 : C78610BD60EB3121 = 948
25248 : 10BF60018E692FBD = 767
25256 : 60EB39B660AF1027 = 893
25264 : 9EAEB6600310269E = 825
25272 : A77A60001027012F = 488
25280 : BD6B478E690F10BE = 835
25288 : 600131ABE0B608BD = 869
25296 : 60E86FA901003 1AB = 826
25304 : E0E6A41027FFF07F = 1295
25312 : 60AF10BF60081F98 = 765
25320 : E6ABE0EEA9FE40AE = 1521
25328 : A9FE2081FF276581 = 1108
25336 : 3C102700C910AEA9 = 675
25344 : FF40342010BE6008 = 713
25352 : 31A9FE008E674F34 = 850
25360 : 0286198D60E83502 = 733
25368 : 3520B76008B660AB = 821
25376 : 4CB12D102700E2B7 = 714
25384 : 60AEB6600BB12A27 = 763
25392 : 3781AB27338155 27 = 695
25400 : 2F81EE2735B18227 = 804
25408 : 4481412753C15427 = 700
25416 : 5510BC0100276111 = 395
25424 : B341002755118314 = 488
25432 : 0027493931AB208E = 560
25440 : 694FB609BD60E839 = 901
25448 : BE609B308B64BF60 = 1012
25456 : 9B39BE609B308900 = 838
25464 : CBBF609BB66000BB = 1059
25472 : 0AB7600039BE609B = 787
25480 : 30B90096BF609BB6 = 957
25488 : 600CBB05B7600039 = 576
25496 : B603BD63B639B601 = 797
25504 : BD63B639B602BD63 = 951
25512 : B639B604BD63B639 = 904
25520 : B605BD63B539BD5B = 962
25528 : 7ABE60A4F660A9A7 = 1202
25536 : B55CF760A939BE69 = 1041
25544 : 4FB61010BE60AC31 = 752
25552 : ABE0BD60E3BD6B7A = 1327
25560 : BE609B30B904E2BF = 1047
25568 : 609B7F60AC7F0112 = 792
25576 : 7F01137F60AE393D = 790
25584 : 617E86EDB7FF22BD = 1255
25592 : 8006812026F9B601 = 717
25600 : B760AA86E5B7FF22 = 1284
25608 : 394F7F6008 7F6009 = 599
25616 : 10BE60A4E6A08B0A = 957
25624 : 3DF3600BFD600810 = 781
25632 : 8C60A926EFFC6008 = 1038
25640 : C18C262B8E00148D = 765
25648 : 6E7A9D6B47301F26 = 713
25656 : F6BE609B10BE0014 = 865
25664 : 3C8864EF609B7C60 = 946
25672 : 003430BD617EBD6B = 808
25680 : 7A3530313F26E986 = 740
25688 : 02D760AA397C6003 = 731
25696 : 8E0EC0ED64738E14 = 914
25704 : 00BD64738E1160BD = 846
25712 : 640F39341030B902 = 507
25720 : 00BF600B35103184 = 545
25728 : 4F1CFA3401350166 = 566
25736 : A034014C8120 26F5 = 732
25744 : 350131844F1CFA34 = 644
25752 : 01350166A034014C = 446
25760 : 812026F535013000 = 682
25768 : 20BC60082 6DC3934 = 679
25776 : 1030890200BF6008 = 496
25784 : 35103184B61F1CFA = 693
25792 : 3401350169A63401 = 431
25800 : 4AB1FF26F5350131 = 844
25808 : 84B61F1CFA340135 = 601
25816 : 0169A634014AB1FF = 783
25824 : 26F53501308E20BC = 741
25832 : 600826CE39B66003 = 686
25840 : 810410269C6A7F60 = 672
25848 : 03B60EFF108E0EDF = 849
25856 : BD6536108E117F86 = 780
25864 : 10BD60E8B6143F10 = 814
25872 : 8E141FBD6536BD65 = 827
25880 : B7108E0EC08610BD = 881
25888 : 60E8B611801 08E11 = 830
25896 : 60BD6536108E1400 = 618
25904 : B610BD60E839B144 = 921
25912 : 271A8111271A81E6 = 635
25920 : 271A81DE271A815E = 704
25928 : 271A8114271A8100 = 408
25936 : 272E20308E6BBF39 = 659
25944 : 8E68AF398E68DF39 = 1004
25952 : 8E68CF398E68EF39 = 1052
25960 : A6A900C08150273E = 837
25968 : A6A901E08114272A = 790
25976 : 8141272A8E68FF39 = 833
25984 : 8E694F39815427 16 = 657
25992 : 8141271EA6A900C0 = 790
26000 : 8150271AA6A901E0 = 834
26008 : 81142706200BBE69 = 481
26016 : 8F398E699F398E69 = 910
26024 : AF398E69BF398E69 = 974
26032 : CF398C68BF27A18C = 1039
26040 : 68DF27A4397C6006 = 813
26048 : 7C60048E0A40BD65 = 730
26056 : EAB6600481141026 = 719
26064 : 9BBEB66005B10610 = 731
26072 : 279B85BE691FBD65 = 895
26080 : F7B610BD60E87F60 = 1137
26088 : 0439B660068 1B010 = 618
26096 : 25FEBC15FE7D39B6 = 1119
26104 : 600681802505108E = 559
26112 : 0A40391 08E0A5F39 = 451
26120 : 4FBD6B3C8E1B4086 = 802
26128 : AA9780BC1B6026F9 = 1015
26136 : 8E0C4085FFA7808C = 1042
26144 : 0C6026F95F8E6A8F = 881
26152 : 861034043D308B35 = 507
26160 : 0434048 6023D108E = 415
26168 : 060B31A535048610 = 438
26176 : BD60E85CC10826DD = 1069
26184 : BE6B0F108E0EC234 = 682
26192 : 30A684BD6717B610 = 811
26200 : BD60E83530300131 = 716
26208 : 228C6B1E270C8C6B = 609
26216 : 2D270D8C6B3C270E = 457
26224 : 20DD108E116120F8 = 805
26232 : 108E140220F28E69 = 701
26240 : 2F108E19308610BD = 617
26248 : 60E8BE0A404F108E = 781
26256 : 691FC6054C34023D = 530
26264 : 8E0A3E308B1E1286 = 583
26272 : 10BD60EB35021E12 = 636
26280 : B10626E68E6A7F10 = 794
26288 : 8E061B8610BD60E8 = 842
26296 : 8E69EF3121BD60E8 = 1085
26304 : 8E6A6F3121BD60E8 = 958
26312 : 8E6A5F3121BD60E8 = 942
26320 : 8E6A1F3121BD60E8 = 878
26328 : 398E1930BF600186 = 694
26336 : 32B760007F60031C = 583
26344 : FA1FA9F760077F60 = 1023
26352 : 047F60057F60067F = 588
26360 : 60A97F60AA7F60AB = 1052
26368 : 7F01127F01137F60 = 516
26376 : AE7F60AF398E0000 = 771
26384 : BF609B7F60003981 = 851
26392 : 0423218109231281 = 392
26400 : 0A270AB10B10269A = 407
26408 : 378E68FF398E68EF = 1093
26416 : 398E698F8005C610 = 794
26424 : 3D308B398E68AFC6 = 924
26432 : 103D308B30103939 = 442
26440 : B600ED633C86E3B7 = 1036
26448 : FF22B7FFC3B7FFC5 = 1557
26456 : B7FFC7CE6C0A8E09 = 1100
26464 : C13184A6C0B15827 = 988
26472 : 1D3121341C30881D = 392
26480 : BF60C8351C10 9C60 = 664
26488 : 0026E0308902008C = 603
26496 : 13C025DD2C0E3476 = 685
26504 : 8610BE693FBD60E8 = 977
26512 : 357620D50E060086 = 698
26520 : FFA7808C070026F9 = 984
26528 : 8E68CF108E074486 = 820
26536 : 100D60E00E60DF10 = 1018
26544 : 8E075A8610BD60E8 = 906
26552 : 8E692F108E1B5EB6 = 707
26560 : 10BD60E8108E1B5E = 812
26568 : C60430A486101CFB = 843
26576 : 6984691F1CFB6984 = 889
26584 : 691F3088204A26EE = 702
26592 : 342010BE0BBB313F = 552
26600 : 26FC35205A26DB31 = 771
26608 : 3F10BC1B4426D1ED = 750
26616 : 6B478E690F108E1A = 624
26624 : 248608BD60E831AB = 912
26632 : E06FA900E43A06CC = 774
26640 : 00FF83000110 83C0 = 534
26648 : 0126F73506A6A427 = 714
26656 : E0BD6B7A8E694F10 = 984
26664 : 8E07448618BD60E8 = 892
26672 : 8EFFFF301F26FC5F = 1116
26680 : 8E6A8F861034043D = 658
26688 : 308B350434048603 = 437
26696 : 3D108E178131A535 = 638
26704 : 048610BD60E85CC1 = 956
26712 : 0826DD8E0600A684 = 713
26720 : 26048655A7843001 = 609
26728 : BC15002AF1CF0100 = 647
26736 : 1CFB8610BE178031 = 771
26744 : B4C6201CFB668430 = 923
26752 : 015A26F96F8431A8 = 838
26760 : 2030A44A26EB3420 = 675
26768 : 108E0FFF313F26FC = 830
26776 : 3520335F11830000 = 379
26784 : 26D0108EFFFF313F = 1026
26792 : 26FC4FBD6B3C3910 = 798
26800 : 4456541054646565 = 640
26808 : 645410102A000004 = 262
26816 : 1195150415195959 = 415
26824 : 19150404A8000038 = 278
26832 : E6BBEE382038EEBB = 1224
26840 : EEBB2C3810550038 = 682
26848 : DEBBEE380C38EEBB = 1196
26856 : EEBB2C380455009B = 769
26864 : 5E9BDE57EEB7DD99 = 1353
26872 : DD99E6BBEEBBEE14 = 1474
26880 : 14557B6579575677 = 742
26888 : 5955551414828214 = 579
26896 : 142814141414003C = 200
26904 : D7D7D7D7D73C00 = 1350
```

```
26912 : 1428282828288E96 = 560
26920 : 96969696BEBE2800 = 1020
26928 : 002828EB28282828 = 475
26936 : 282828AAAA8282EE = 958
26944 : BBEEBBEEBBEEBBEE = 1700
26952 : BBEEBBEEBBEEBB00 = 1462
26960 : 0000000000000000 = 0
26968 : 0000000000000000 = 0
26976 : 0000000000000000 = 0
26984 : 0000000000000000 = 0
26992 : 0000000000000000 = 0
27000 : 0000000000000000 = 0
27008 : 0000000000000000 = 0
27016 : 0000000000000014 = 20
27024 : 5441414145545050 = 592
27032 : 5445414141541414 = 472
27040 : 1441414141414141 = 475
27048 : 4141414141141414 = 385
27056 : 1441414141414141 = 475
27064 : 4141414141414141 = 520
27072 : 4141414141414141 = 520
27080 : 4141414141141414 = 385
27088 : 1441414040501405 = 383
27096 : 0101014141141414 = 193
27104 : 1441414141414141 = 475
27112 : 4141414141141404 = 369
27120 : 1454440404040404 = 192
27128 : 0404040404151528 - 102
27136 : 2A82820202080808 = 330
27144 : 20202080800AAAA14 = 712
27152 : 1541410101041414 = 197
27160 : 0401014141151482 = 307
27168 : 828282828282AAAA = 1120
27176 : 0202020202020255 = 99
27184 : 5540404040545401 = 510
27192 : 010101414114143C = 233
27200 : 3FC3C0C0C0FCFCC3 = 1533
27208 : C3C3C3C3C33C3CAA = 1265
27216 : AA02020A0808080C8 = 216
27224 : 282020A08C808014 = 668
27232 : 1441414141411414 = 385
27240 : 414141414114143C = 425
27248 : 3CC3C3C3C3C33F3F = 1141
27256 : 030303C3C33C3C28 = 559
27264 : 28AAA6969A9A9A9A = 1142
27272 : 9A9A96A6AA28282A = 916
27280 : 2A20202020202020 = 266
27288 : 20E0E0E0E0EAEA2A = 1438
27296 : 2A222222222A2A22 = 796
27304 : 22E2E2E2E2E2E2AA = 1560
27312 : AA82828282828AA8A0 = 1156
27320 : AAAA828E8E8E8E28 = 1078
27328 : 2882828282828282 = 950
27336 : 82828E8E8E8E8E2A = 1012
27344 : 2A00080030808080C8 - 98
27352 : 3838383838382A2A82 = 494
27360 : 828282828282828E = 1052
27368 : 8E8E8E8E8E8E20202A - 832
27376 : 2A222222222A2A22 = 296
27384 : 22E2E2E2E2E2E280 = 1518
27392 : 808080808C80800C0 - 1024
27400 : B0B0E0B0BCAAAAC1 = 1221
27408 : 0105CA0103030303 = 29
27416 : 010103010603080C2 = 25
27424 : 0202C20204040BC7 = 34
27432 : 0402040402030303 = 25
27440 : 0B01C10309030103 - 32
27448 : 030101018E0600A7 = 321
27456 : 808C1E0026F93934 = 694
27464 : 32B6FF238A08B7FF = 1106
27472 : 238EC00186FDB7FF = 1003
27480 : 20BD6B737FFF20BD = 1046
27488 : 6B733001BC005525 - 533
27496 : EBB6FF2384F7B7FF = 1524
27504 : 2335B21F12313F26 = 465
27512 : FC393432B6FF238A - 1021
27520 : 08B7FF238E019086 = 902
27528 : 64B7FF20BD6B737F = 1108
27536 : FF20BD6B73301E8C = 916
27544 : 015E26EBB6FF2384 = 972
27552 : F7B7FF2335B2FF00 = 1206
```

Utility programs

Simon Weston,
Falmouth,
Cornwall.



THESE THREE UTILITY programs are aimed mainly at users who have found that with their 8 or 16K RAMpacks plugged in they cannot make use of a programmers' aid cartridge without a motherboard. The programs will work on a Vic-20 with any or no expansion.

The programs are all completely separate and independent and only one can be in the Vic-20 at any one time. The programs occupy free area in the bottom IK of the computer at 673-767. This means that you don't lose any of your precious memory except for the Delete which is longer and takes up 38 bytes of user RAM as well. With all three utilities other programs can be newed, loaded and saved etc, and the utility will remain until either it is overwritten or the Vic is swtiched off.

When entering either Find or Renumber Save the utility before you run it, then run it and a checksum will tell you if you have made an error when typing in the data. The checksum is very sueful and I find that it eliminates 90 per cent of typing errors. The utility must then be re-saved if necessary and can then be Newed.

The Delete however, needs the bottom of memory pointers raised first to accommodate it, this is done by typing in the following in direct mode:

A = PEEK(44):B = PEEK(43)
POKE44,A:POKE43,
B + 39:POKEA*256 + B + 38,0:NEW

The Delete can then be treated in the same way as the other utilities.

The Find prints the line numbers of all the lines containing the characters you want found on the screen. To use the Find type:

SYS673:???

Where '???' is the set of characters you want found and '???' can be anything up to 81 characters long.

```
20 REM  *   DELETE   *
80 FORI=673TO761
90 READA
100 POKEI,A
110 T=T+A
120 NEXT
130 A=PEEK(44):B=PEEK(43)
140 IFB<39THENB=B+256:A=A-1
150 B=B-39:C=A*256+B
160 POKE763,A:POKE762,B
170 FORI=CTOC+37
180 READA
190 POKEI,A
200 T=T+A
210 NEXT
220 IFT=12909THEN240
230 PRINT"DATA ERROR"
240 END
250 DATA 165,0,133,20,165,1,133,21
260 DATA 32,19,198,144,21,165,95,133
270 DATA 0,165,96,133,1,165,2,133
280 DATA 20,165,3,133,21,32,19,198
290 DATA 176,3,76,8,207,160,2,132
300 DATA 4,177,95,145,0,240,20,200
310 DATA 76,202,2,200,177,95,240,4
320 DATA 136,76,239,2,145,0,133,4
330 DATA 76,217,2,192,4,144,232,200
340 DATA 177,95,145,0,240,229,165,0
350 DATA 133,87,165,1,133,88,152,24,76
360 DATA 101,0,133,0,144,2,230,1
370 DATA 152,24,101,95,133,95,144,2
380 DATA 230,96,160,0,165,0,145,87
390 DATA 200,165,1,145,87,200,196,4
400 DATA 208,3,76,202,2,96
```

```
20 REM  *   FIND   *
80 FORI=673TO761
90 READA
100 POKEI,A
110 T=T+A
120 NEXT
130 IFT=9272THEN150
140 PRINT"DATA ERROR"
150 END
160 DATA 165,43,133,0,165,44,133,1
170 DATA 160,2,177,0,133,2,200,177
180 DATA 0,133,3,200,132,4,162,0
190 DATA 189,5,2,240,9,209,0,200
200 DATA 25,232,200,76,185,2,132,4
210 DATA 166,2,173,13,3,32,205,221
220 DATA 169,32,32,210,255,164,4,76
230 DATA 180,2,177,0,208,213,200,177
240 DATA 0,208,6,200,177,0,208,2
250 DATA 96,200,152,160,1,24,101,0
260 DATA 133,0,144,152,230,1,76,171,2
```

Sound Editor

Paul Lambert,
Solihull,
West Midlands.

THIS PROGRAM DRAWS graphs of an envelope for sound, thus making it much easier to understand what a sound is going to be like when played. It produces graphs almost identical to the one found on page 9 of chapter 6 of the manual. The program may be used equally well to plan volume envelopes as tone envelopes. Try this envelope and display its graph.

ENT 1, 50, 10,5 50, 5, 5, 50, 5, 5, 25, 5, 5:
SOUND 1, 284,855,5,0,1

Sections to this envelope =4. The program includes a facility to listen to the sound which you have created. The program not only demonstrates what remarkable effects are possible but also the graphics on the Amstrad. It is quite possible that effects such as aircraft taking off, train scunds, car noises can be obtained using envelopes and this program is a visual aid to obtaining such sounds.

Amstrad Sound Editor.

```
5 DIM p(5),q(5),r(5)
10 MODE 1:INK 0,1:INK 1,24:INK 2,6:INK 3,21
15 GOSUB 1000:CLS
20 ORIGIN 90,0:DRAW 0,400,3:MOVE 0,200:DRAW 550,200
25 PEN 2
30 FOR t=1 TO 6:READ a$:LOCATE 1,t:PRINT a$:NEXT t
40 DATA "T P","o e","n r","e i"," o"," d"
50 LOCATE 34,12:PRINT"Time"
65 PEN 1:MOVE 5,200:DRAW 5,190,1:LOCATE 4,1:PRINT range:LOCATE 4,25:PRINT-range
70 MOVE 545,200:DRAW 545,190,1:t$=STR$(time):LOCATE 36,14:PRINT SPC(4-LEN(t$));t$:LOCATE 6,14:PRINT"0"
75 MOVE 0,200
80 FOR r=1 TO n
90 GOSUB 2000
95 epx=XPOS:epy=YPOS
96 MOVE epx,epy:DRAW epx,epy,3
97 DRAW epx,200,2:MOVE epx,epy
100 NEXT r
110 PEN 1:LOCATE ,9:PRINT"Push":PRINT:PRINT"  A":PRINT:PRINT" to":PRINT:PRINT"start"
120 IF INKEY$<>"a" THEN 120 ELSE RUN
1000 PEN 2:LOCATE 14,1:PRINT"Envelope Graph"
1005 LOCATE 14,2:PRINT"-------- -----"
1010 LOCATE 2,4:PEN 1:INPUT"No. sections of env";n
1015 IF n>5 THEN PRINT"error":GOTO 1010
1020 FOR g=1 TO n
1025 PEN 1
1030 PRINT:PRINT"Section ";g:PRINT"------- -"
1032 PEN 2:INPUT"Step Count";p(g)
1033 INPUT"Step Size";q(g)
1034 INPUT"Pause Time";r(g)
1040 NEXT g
1042 minus=0:posit=0
1045 FOR y=1 TO n
1050 IF (p(y)*q(y))<0 THEN minus=minus-(p(y)*q(y)):GOTO 1070
1060 IF (p(y)*q(y))>0 THEN posit=posit+(p(y)*q(y))
1070 time=time+(p(y)*r(y))
1075 NEXT
1080 IF posit>minus THEN range=posit ELSE range=minus
1081 scalex=190/range:scaley=530/TIM
1085 PEN 1:PRINT"Try envelope?"
1086 a$=INKEY$:IF a$="" THEN 1086
1087 IF a$="y" THEN GOSUB 2500
1090 RETURN
2000 a1=p(r):a2=q(r):a3=r(r)
2005 spx=XPOS:spy=YPOS
2010 FOR u=1 TO a1
2030 DE=a3*scalex
2040 DRAW DE,0,1
2050 SP=a2*scaley
2060 DRAW 0,SP,1
2070 NEXT u
2080 RETURN
2500 PRINT:INPUT"Start Tone Period";nt
2510 ENT 1,p(1),q(1),r(1),p(2),q(2),r(2),p(3),q(3),r(3),p(4),q(4),r(4),p(5),q(5),r(5)
2520 SOUND 1,nt,tim,5,0,1
2530 PRINT:PRINT"Hit any key"
2540 IF INKEY$="" THEN 2540
2550 RETURN
```



BECOME LONE WOLF...

... sole survivor of a devastating attack on the monastery of Kai.



A great cloud of black winged beasts has swept down and engulfed the monastery. All the Kai Lords, whose secret skills you were learning, have been killed.

Raising your face to the sky, you swear revenge on the Darklords of the West. But first, you must warn the King of the invasion, retrieve Sommerswerd and then use it to beat off the attackers. There are now two exciting LONE WOLF adventure games. Each one requires you to assume the mantle of Lone Wolf, make all his decisions for him, and actually fight his combats move by move. You really are Lone Wolf.

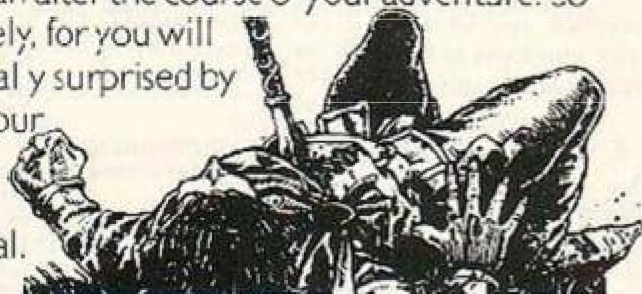
You are going on a journey, a quest. You create your own adventures, choose your own tactics and make your own decisions.

You swear

THE LESSONS OF COMBAT AND ENDURANCE

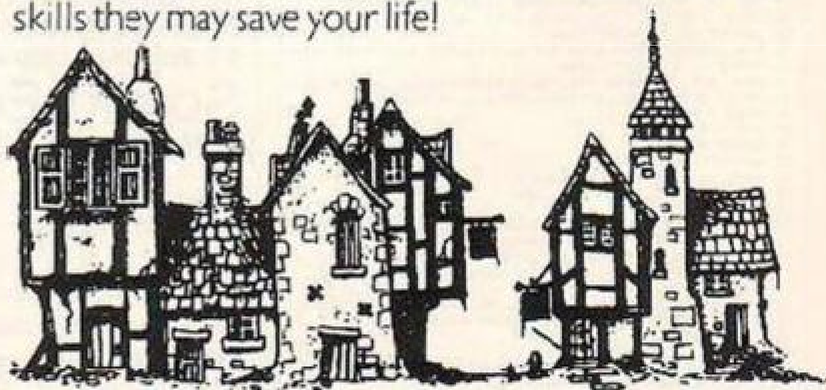
When you were training with the Kai Lords, you acquired many secret skills and disciplines. Now, you may need to use them. You may need to improve some, and disregard others.

"Combat Skills" may be needed to defeat the enemies you encounter on your way to reaching the beleaguered King, and whilst saving your country. You will need "Endurance" to survive. Each decision you make can alter the course of your adventure. So choose wisely, for you will often be totally surprised by the effect your choice may have on your survival.



THE SURVIVAL DISCIPLINES

Over the centuries, the Kai Lords had mastered the skills of the warrior. As you proceed through your adventure you may find that you are becoming more and more proficient. If you, too, have mastered these skills they may save your life!



You can learn how to hide undetected amongst rocks and trees of the countryside. In a city, you can look and sound like a native which may help you to find shelter.

Learn how to communicate with animals and move objects by sheer concentration alone.

You can develop a "Sixth Sense" that warns you of imminent danger. It may also reveal the true nature of a stranger.

"Tracking" may help you choose the right path and decipher prints or tracks of creatures in the wild



The discipline of "Healing" can restore your "Endurance" after being wounded in combat.

THE "COMBAT" SKILLS

When you entered the Kai monastery you were taught to fight with daggers, spears, warhammers, axes and swords.

The evil Darklords, though, have the ability to attack using "Mindforce". Lone Wolf can learn the discipline of "Mindshield" and also "Mindblast", the old Kai Lord's ability to fight using the forces of the mind alone. You, Lone Wolf, control the combat, you decide whether to fight or not, and you alone can manipulate the moves.

THE EQUIPMENT TO SURVIVE

You set out with just an axe, a leather pouch of gold crowns and a map of Sommerlund which you

THE LONE WOLF ADVENTURES

The creators of LONE WOLF are Joe Dever and Gary Chalk. In 1982, Joe won the Advanced "Dungeons and Dragons" Championship in America.



Gary has had 17 years experience of war games, and is the originator of the highly successful "Cry Havoc" and "Starship Captain".

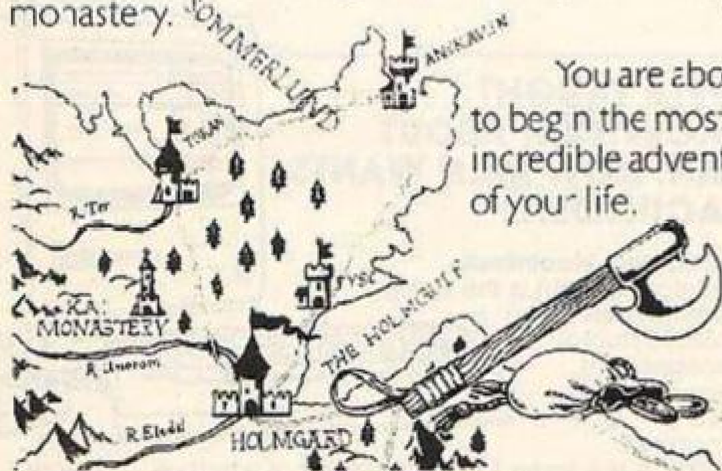
Together they have created two unique adventures combining the skills of mental and physical dexterity. And there are more to come. The presentation is visually exciting, and involves you totally in every action and reaction.



Discover the LONE WOLF adventures "Flight From the Dark" and "Fire on the Water". Now, available individually in a special gift box, including a cassette and illustrated book for £8.95. (Software only £6.95 each.)

revenge

have discovered amongst the smoking ruins of the monastery.

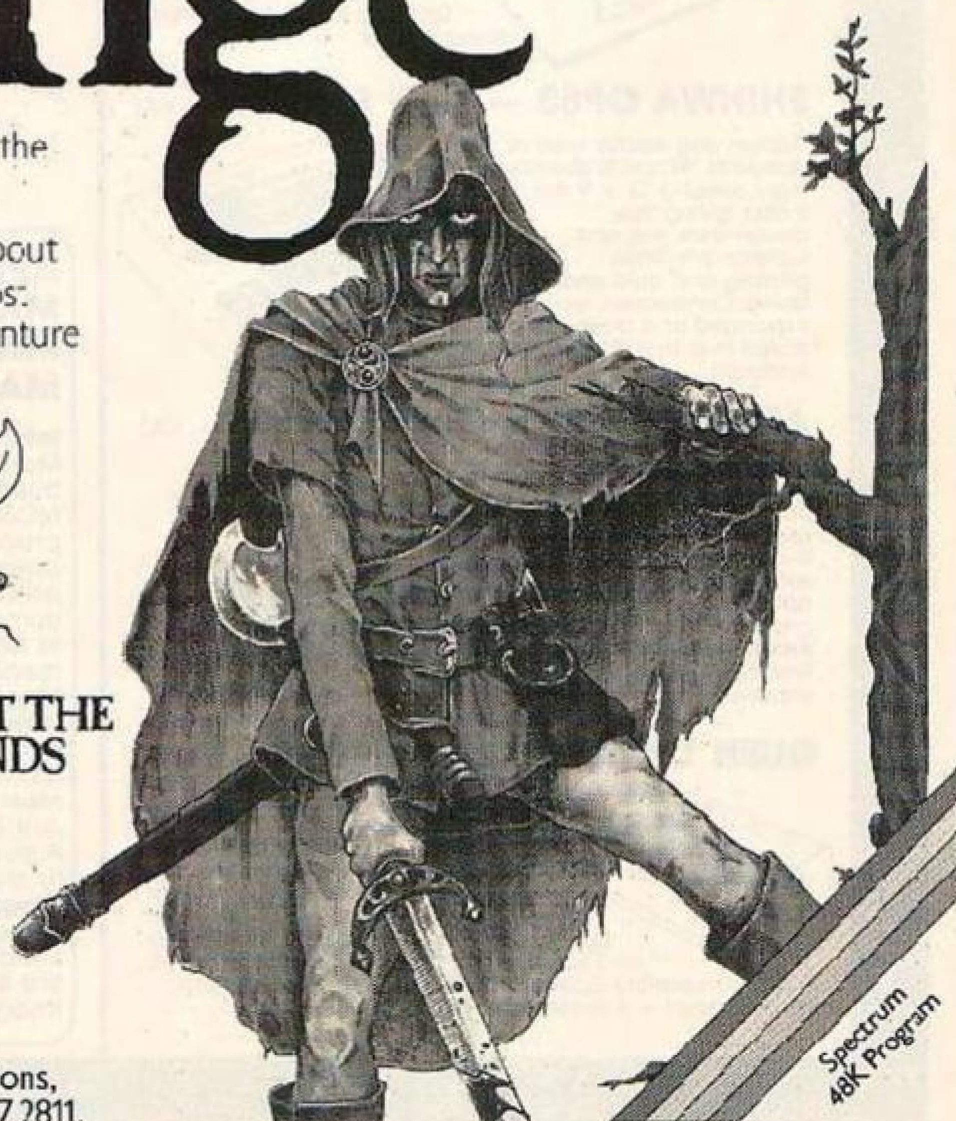


You are about to begin the most incredible adventure of your life.

WE CHALLENGE YOU TO DEFEAT THE DARKLORDS IN THE LASTLANDS

LONE WOLF

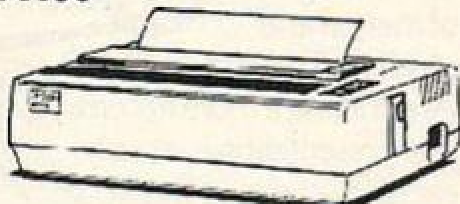
Available from leading software stores.
Dealer enquiries to Nick Ford, Arrow Publications, 17-21 Conway Street, London W1P 6JD. Tel: 01-387 2811.



SCI UK



EPSON LOW PRICE SPECIALS FROM £199.00



EPSON RX 80	100 cps	~~£249~~	£199.00	
EPSON RX 80 FT	100 cps	~~£285~~	£229.00	
EPSON FX 80	160 cps	~~£436~~	£324.00	PLUS
EPSON MX 100	100 cps	~~£475~~	£369.00	VAT
EPSON RX 100	100 cps	~~£458~~	£385.00	
EPSON FX 100	160 cps	~~£569~~	£499.00	

JUKI 6100 — ~~£399~~ £349.00 + VAT



20 CPS: Bidirectional & Logic 10, 12, 15 & Proportional Spacing: Wordstar compatable: 2K Buffer; 13 inch Platen: Underline; backspace & lots more: Centronics Interface Standard. Optional RS232, Tractor and Sheet Feeder

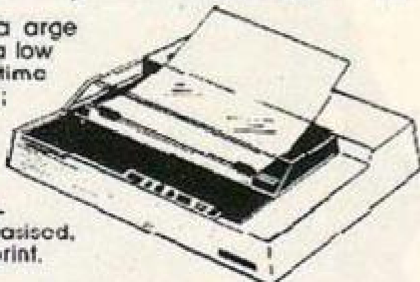
SHINWA CP80 — ~~£299~~ £179.00 + VAT

Friction and tractor feed as standard. 80cps. Bi-directional logic seeking 13 × 9 dot matrix giving true descenders, sub and superscripts. Italic printing and auto underlining. Condensed, emphasised expanded and double strike (can be mixed in a line). Parallel interface fitted as standard.



ADMATE DP80 — ~~£229~~ £169.00 + VAT

The Admate DP-80 has a large range of features and a low price. Ideal for the first time user. 80 cps; 80 column; Bi-directional logic seeking; block and dot addressable graphics; sub/superscript, auto underline, condensed, emphasised, expanded and italic print.

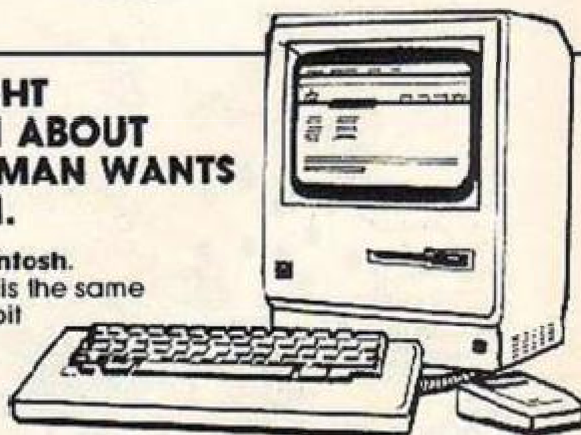


QUEN DATA — ~~£299~~ £199.00 + VAT



A wonderful opportunity to purchase a daisy wheel printer at a price you can afford! Features include: 16CPS; Bi-directional; Logic seeking; Proportional spacing; WordStar compatible; 13" platen — 12" print line; Autoscore; Bold and shadow printing; Sub and superscripts; QUME compatible ribbons; QUME compatible daisywheels; 4 level impression control; Prints original + 4 copies; Low noise.

APPLE TAUGHT MACINTOSH ABOUT MAN. NOW MAN WANTS MACINTOSH.



Introducing Macintosh.
Macintosh's brain is the same blindingly-fast 32 bit MC68000 microprocessor that powers the Lisa personal computer.
Its heart is the same Lisa technology of windows, pull-down menus, mouse commands 32-bit power more useful by making Macintosh far easier to use.

Now for some small talk
If the problem won't come to Macintosh, you can always take Macintosh to the problem — it weighs 9 pounds less than the most popular portable computer.
Just pick Macintosh up by its built-in handle, and carry it.
A micracle of miniaturisation is Machintosh's built-in 3½" drive.
Its discs store 400K — more than conventional 5¼" floppies.

Programs.
There are already plenty of remarkable programs available to keep Machintosh busy. Like MacPaint a program that, for the first time, lets a personal computer produce virtually any image that the hand can create.

7 DAYS A WEEK

* MACINTOSH AND PRINTER DEMONSTRATIONS DAILY AT OUR SHOWROOMS ON THE HOUR

* SUNDAY OPENING

* 24 HOUR DELIVERY SERVICE

* COMPREHENSIVE TECHNICAL SUPPORT

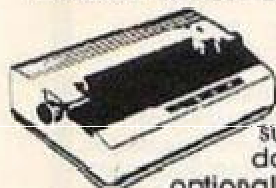
Phone for a Quote 0730-68521 Anytime



CANON PW1080A or KAGA TAXAN 810 — ~~£329~~ £289.00 + VAT

80 cols; High speed printing, 150 cps; bi-directional logic seeking; fantastic 27 cps near letter quality; 23 × 18 matrix; very quiet — less than 60 Db; 4, 5, 6, 8, 10, 12, 17 cpi; down loading for user-optional characters; high resolution graphics; handles various forms, roll paper, fan fold, single sheet and multipart copy paper. Also available — wide bodied Canon PW1156A or KAGA TAXAN KP910 — New low prices!

DAISY STEP 2000 — ~~£299~~ £249.00 + VAT



18 cps; Bi-directional logic seeking; 10, 12, 15 cps; Wordstar compatible; 13 inch platen; 12 inch print line; auto underscore; bold and shadow printing; subscripts and superscripts; Qume compatible daisy wheel; optional tractor and sheet feeder; optional RS232C serial interface; low noise; low cost; high reliability.

There's more software on the way from developers like Microsoft, Lotus and Software Publishing to mention a few. And with Macintosh BASIC, Macintosh PASCAL and our own Macintosh Toolbox for writing your own mouse driven programs, you could turn a few bob in your spare time.

All the right connections
On the back of the machine, you'll find built-in RS232 and RS422 Applebus serial communication ports for connecting printers, modems, and other peripherals without adding expensive cards. If you wish to double Macintosh's storage with an external disc drive, you don't have to pay for a disc controller card — that's built in too.

Talking of extras
Macintosh has a built-in polyphonic sound generator capable of producing high-quality speech and music.



Macintosh automatically makes room for illustrations in text.
MacPaint — virtually any image the human hand can create.
Microsoft's Multiplan for Macintosh.

THE GRAPPLER — ~~£118~~ £102.00 + VAT

Your Commodore 64 can print like a pro!

The Grappler offers a complete answer to printer interfacing, with many capabilities unique in the Commodore market place. Complete signal transmission allows many popular name brand printers to operate perfectly with the Commodore 64. Even Commodore's graphic character set can be reproduced on Epson, Star, Oki, Brother.

Prowriter and other popular printers.

Prints screen graphics without software.

Graphics screen dump routines include rotated, inversed, enhanced, and double sized graphics.

Complete emulation of the 1525 printer for printing Commodores special characters.

Text screen dump and formatting commands.

22 unique text and graphics commands.

CANON PJ 1080A — ~~£459~~ £399.00 + VAT

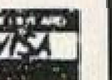
Seven colour printer ideal for the BBC, Sirius, Apple, etc. Seven colours print on demand ink jet printer; 70 cps bi-directional; high resolution graphics; will print on acetate sheets for overhead projection; long life ink cartridges 3.5 million characters per cartridge; eight bit parallel interface; Epson compatible; easily replaced colour cartridges, accepts single sheets; interchangable character sets.











24 hour nationwide delivery by Securicor £9.50 + VAT
Bankers orders; Building Society Cheques; Postal Orders; same day despatch. All orders covered by the Mail Order Protection Scheme.

MANY MORE PRINTERS AVAILABLE 1,000s OF BARGAINS — SEND NOW FOR THE FAMOUS SCI (UK) CATALOGUE



FAST Mail Order
SCI (UK) Unit 16, Inmans Lane, Sheet, Petersfield, Hants GU32 2AN

Freepost Mail Order
SCI (UK) Freepost, Petersfield, Hants GU32 2BR.
Tel. 0730 68521.
Telex 88626 MYNEWS G

PERSONAL CALLERS WELCOME AT OUR MAGNIFICENT NEW SHOWROOMS AT 12 High Street, Petersfield, Hants GU32 2JG.

We wish to acknowledge the several well known trade marks used in this advertisement

URGENT ORDER
SCI (UK) FREE POST, PETERSFIELD, HANTS GU 32 2BR
PLEASE RUSH ME ____
Name ____
Address ____
Credit Card Number ____

All prices include postage & packing.

This November move your shop to Olympia

This year, pre-Christmas sales of home computers are expected to exceed £340 million. And that's without software and add-ons. Which is why a stand at the Your Computer CHRISTMAS FAIR makes more sense than ever before.

You'll get thousands of customers on a spending spree.

And this year, the Your Computer CHRISTMAS FAIR will be bigger, better and earlier than ever before. So you will get an even larger slice of a booming market.

You'll get the benefit of a mammoth promotion in top-selling computer magazines, national press and on radio.

You'll get all the comfort and convenience of the fabulous new Olympia 2 exhibition centre, right in the heart of London — Britain's biggest computer market.

Yet getting your share of this enormous market will cost less than you think.

To find out full details, just fill in and post the coupon today.

Your Computer Christmas Fair

November 30 to December 2.

Sponsored by

YOUR COMPUTER — Britain's leading home computer magazine.



I'd like to know more about taking a stand at YOUR COMPUTER CHRISTMAS FAIR.
Please send me full details.



Name ______

Position ______

Company ______

Address ______

______ Telephone ______

Send to:
The Advertisement Manager, Your Computer Christmas Fair, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS
Tel: 01-661 3127

Settle down with two beautiful opponents~ Suzi & Melissa ~for a sizzling game of...

Strip POKER

64 64

GREAT FOR PARTIES!

NOW AVAILABLE FOR SPECTRUM £7.95

cassette £9.95

commodore 64 disk £12.95

Apart from the excellent game play of the poker the added bonus is high resolution pictures as the girls shed their clothes! A classic of its kind – must be part of any comprehensive collection of software.



THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD

U.S. Gold is stocked by all leading computer stores.

DEALERS! For information on how to become a U.S. Gold Stockist write to: CentreSoft Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH. Telephone: 021-520 7591. Telex: 337268. Overseas enquiries welcome.

U.S. GOLD

All American Software

Choosing a printer is a lot easier than choosing a computer.

THERE are dozens of quality printers from which to choose. With quality price tags of around £250.

The Brother M-1009, however, breaks all the rules.

Stays defiantly below the £200 barrier.

Though it has far more than its fair share of features, it maintains the extraordinarily low price of £199.95.

Travels at a steady fifty.

In the speed stakes, the M-1009 is certainly no slouch, being fully capable of up to 50 characters per second.

Providing bi-directional and logic seeking printing for normal characters and uni-directional printing for super and sub script and graphics.

Prints on any paper.

Being an impact printer, the M-1009 will print on virtually any paper, including letter headings, invoices and standard office stationery.

It will even print two copies together with your original.

A superb character recommendation.

In its price range, the M-1009 has a great deal more character than many printers.

96 no less, plus international type and graphic characters.

Reliability comes as standard.

Built to the same exacting standards as Brother's elite office printers, the Brother M-1009 already has faultless credentials for reliability.

Its 9 x 9 dot matrix head, for example, has an astonishing 20 million character service life.

One printer that doesn't block out the light.

Many home computers tend to be a little on the large side.

In contrast, the compact M-1009, at only 7 cm high, keeps a discreet profile.

Well designed, reliable – and conscientious.

The Brother M-1009.

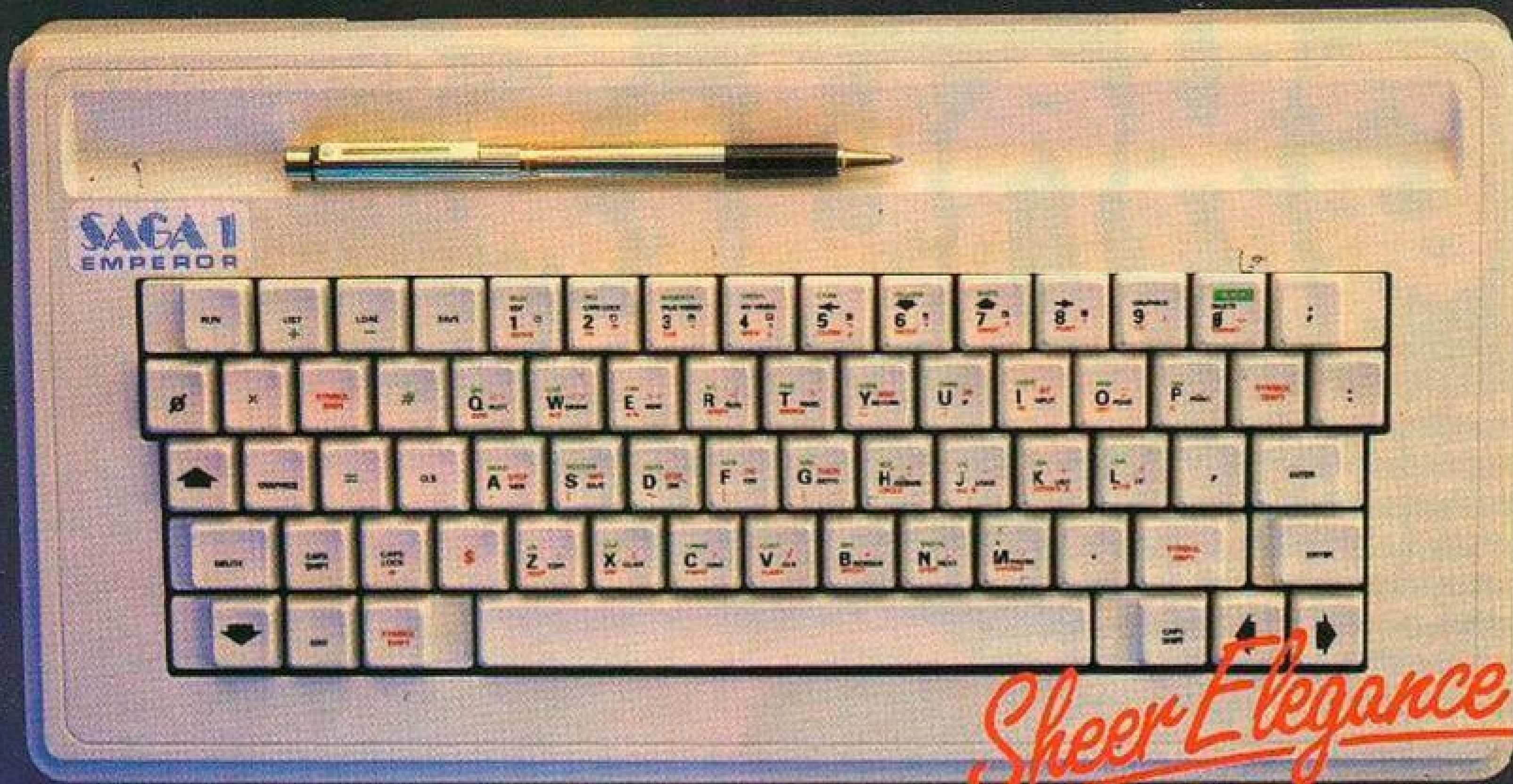


The future at your fingertips.

DEPT P, BROTHER OFFICE EQUIPMENT DIVISION, JONES + BROTHER, SHEPLEY STREET, GUIDE BRIDGE, AUDENSHAW, MANCHESTER M34 5JD.
TEL: 061-330 6531 (10 LINES) 061-330 0111 (6 LINES) 061-330 3036 (4 LINES) TELEX: 669092
BROTHER INDUSTRIES LIMITED, NAGOYA, JAPAN.

—AVAILABLE FROM—

LASKYS, BOOTS, W.H. SMITH, WILDINGS, SPECTRUM U.K., MAJOR DEPARTMENT STORES AND BROTHER OFFICE EQUIPMENT RETAILERS.



Sheer Elegance

SAGA 1 EMPEROR

THE KEYBOARD FOR ZX SPECTRUM COMPUTERS

AVAILABLE NOW

- EASY FITTING
- PLEASURE TO USE
- LONG LASTING
- SELLING FAST

Saga 1 Emperor, equipped with 67 keys, has been carefuly designed to incorporate the prime keyboard functions of the ZX Spectrum personal computer.

The style is easy: — for your benefit, the SAGA 1 Emperor Keyboard and housing retains the rear expansion dimensions and accessibility for compatibility with all Sinclair's own peripherals including interfaces and microdrive 1 and most other add-ons . . . including ours!

Not only this but we have ensured that the assembly of the keyboard is simple — and fast. No soldering is required, so that within just 5 minutes you can replace your current ZX Spectrum keyboard with the new SAGA 1 Emperor.

AND ALL THIS FOR JUST £54.95 (inc. VAT)

SOUNDBOOST



Hear that keyboard click . . . with a SAGA SOUNDBOOST
Your Spectrum's sound could be continuously adjustable from a whisper to a roar through your television. With our soundboost, no modifications need be made — just three easy push on connections. Supplied built and tested to fit in minutes with no previous experience required; we send full instructions for immediate use. Yours for Only **£9.49**

FLEXICABLE



Developed to relieve your Spectrum from the pressures of life. This neat 9 inch FLEXICABLE comes with two connectors which fit your Spectrum and your add-ons — taking the load with ease. Only **£9.49**

DEALERS CONTACT CAROL MOTE ON WOKING 69527

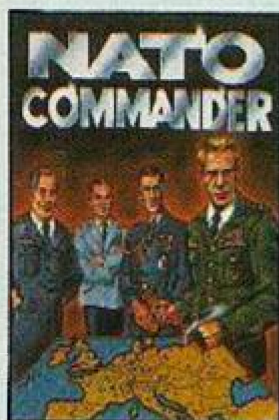
These products are obtainable through stockists both in the U.K. and abroad, or call us and we will deliver direct — our products are available ex-stock.

Stop press just released, two NEW products added to our range:

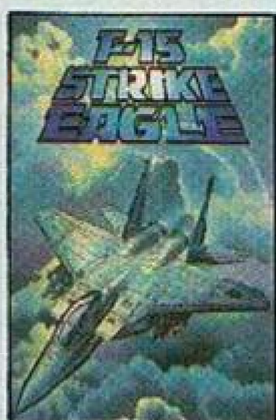
1 — latest top quality dust covers available just £4.95
2 — Saga PC! — your very own carry case! — fits everything — keyboard, data recorder etc — Customise — further details and spec sheet available on request.

Please write to: SAGA Systems Limited
Woodham Road, Woking, Surrey
Telephone Woking (04862) 69527/22922
or Telex 859238
all prices include VAT
P&P free for Sound Boost and Flexicable.
P&P £1.25 for SAGA 1 Emperor U.K.
£4.00 for SAGA 1 Emperor Europe
Please send me
Name . . . .
Address . . . .
. . . .
The following SAGA PRODUCTS
. . . .
Please make CHEQUES/P.O. Payable to SAGA Systems Ltd.

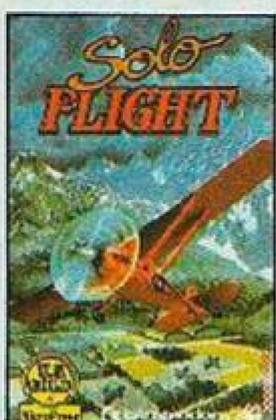




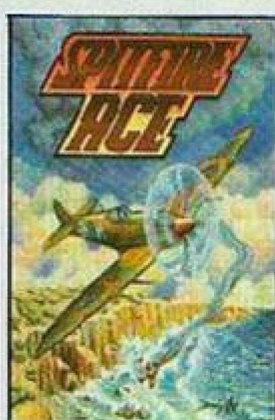
NATO COMMANDER
Atari/64: C£9.95; D£12.95



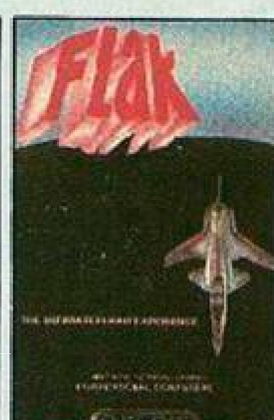
F-15 STRIKE EAGLE
Spectrum: £7.95
Atari/64: C& D £14.95



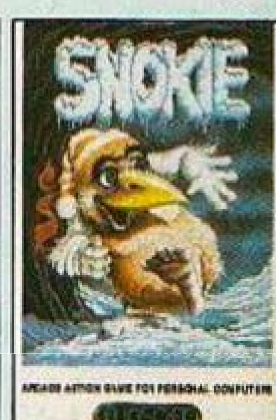
SOLO FLIGHT
Spectrum: £7.95
Atari/64: C& D £14.95



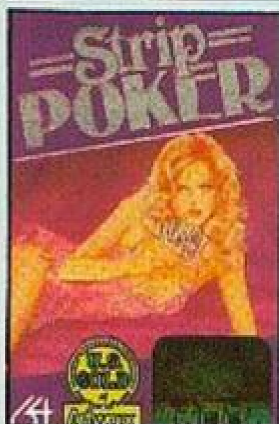
SPITFIRE ACE
Atari/64: C£9.95; D£12.95



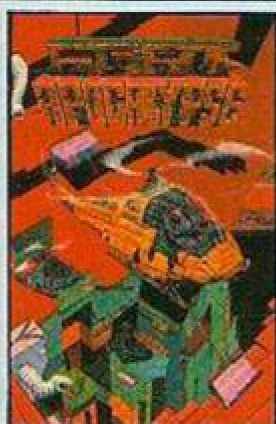
FLAK
Atari/64 D£14.95

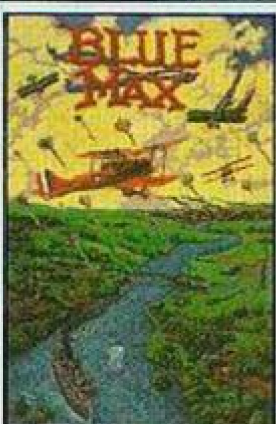


SNOKIE
Atari/64: C£9.95; D£12.95

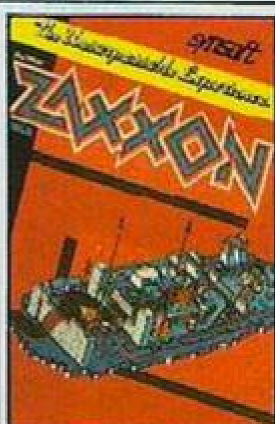


STRIP POKER
Spectrum: £7.95
64: C£9.95; D£12.95

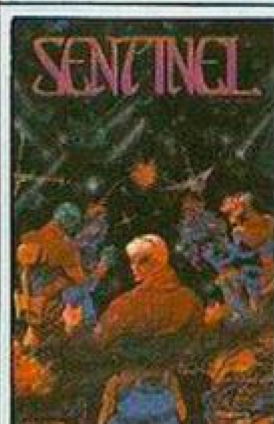

FORT APOCALYPSE
Spectrum: £7.95
Atari/64 C£9.95; D£14.95



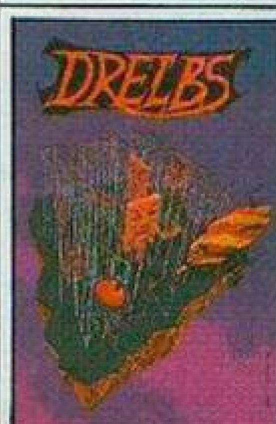
BLUE MAX
Spectrum: £7.95
Atari/64: C£9.95; D£14.95



ZAXXON
Spectrum: £7.95
Atari/64: C£9.95; D£14.95



SENTINEL
64: C£9.95; D£14.95



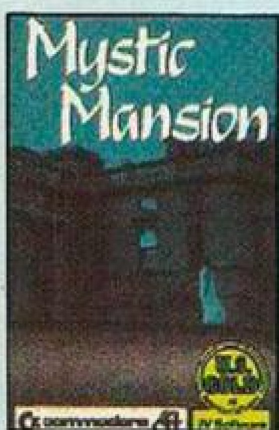
DRELBS
Atari/64: C£9.95; D£14.95

U.S. Gold proudly presents 24 exciting titles from its fast growing and best selling range – the ultimate in American software!

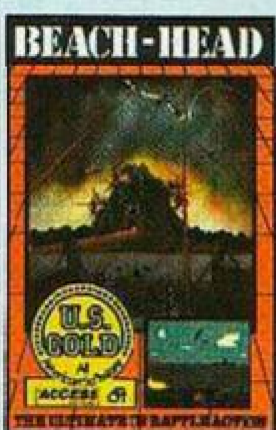
U.S. Gold is stocked by all leading computer stores including: Boots, John Menzies, W.H. Smith, Wildings and Woolworth.

GOLD  RUSH!

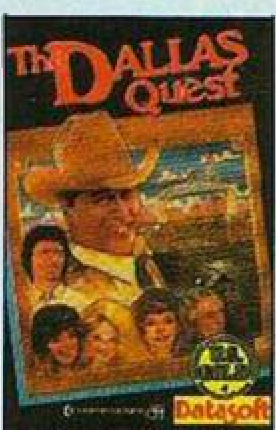
For details on how to become a U.S. Gold stockist write to: CentreSoft Ltd., Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH. Telephone: 021-520 7591. Telex: 337268 CSOFT-G.



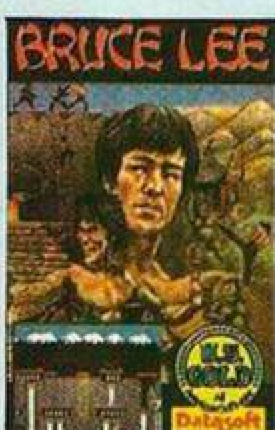
MYSTIC MANSION
64: C£8.95; D£12.95



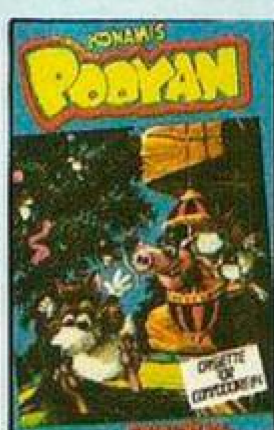
BEACH-HEAD
Spectrum: £7.95
Atari/64: C£9.95; D£12.95



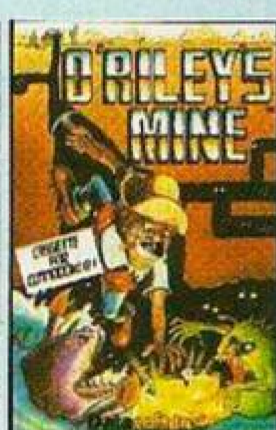
DALLAS
Atari/64: D£14.95



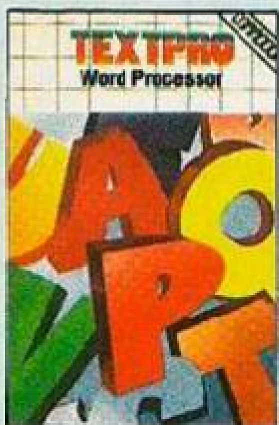
BRUCE LEE
Spectrum: £7.95
Atari/64: C& D £14.95



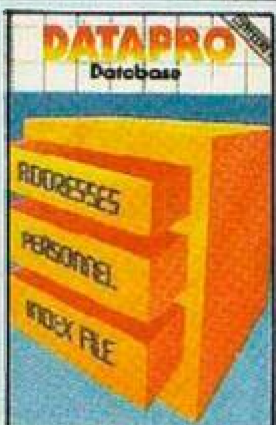
POOYAN
64: C£9.95; D£12.95



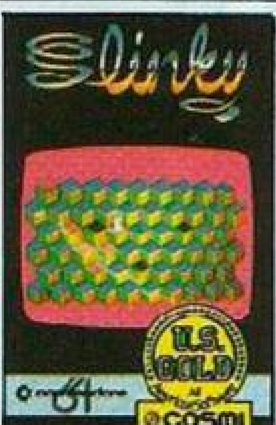
O'RILEY'S MINE
Atari/64: C£9.95; D£12.95



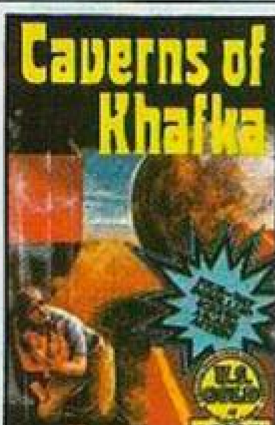
TEXTPRO
64: C£9.95; D£12.95



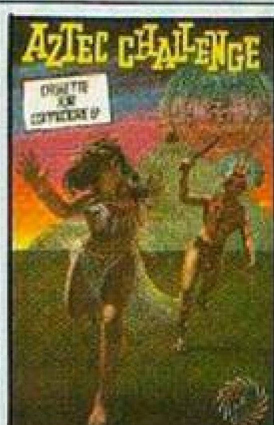
DATAPRO
64: C£9.95; D£12.95



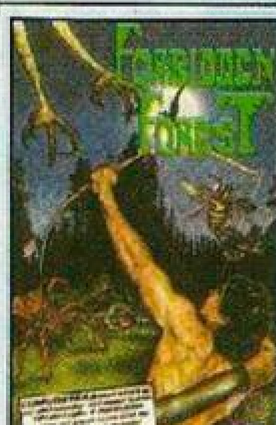
SLINKY
Atari/64: C£8.95; D£12.95



CAVERNS OF KHAFKA
Atari/64: C£8.95; D£12.95



AZTEC CHALLENGE
Atari/64: C£8.95; D£12.95



FORBIDDEN FOREST
Atari/64: C£8.95; D£12.95

Italian Distribution by Giucar, Bologna 532575.

The Key To Success!

Now, with the new Stonechip Spectrum Keyboard, the user has no worry of damaging the Spectrum itself as improved designing enables it to fit the case perfectly.

Assembling the case is simple as it consists of two halves, the top half containing the keyboard, with a small printed circuit board, attached by ribbon cable, plugging into the rear of the Spectrum. The lower half fits precisely around the Spectrum, thus preventing any risk of damaging through movement.

Your Sinclair guarantee need not be invalidated since the Spectrum does not require removal from its case.



THE MAIN FEATURES OF THE KEYBOARD ARE:

- No modifications to Spectrum necessary as it connects via rear port.
- Full-length space bar.
- Built-in 'Echo' amplifier and tape interface.
- RESET keys remove the need to disconnect power supply lead.
- Single key 'DELETE'.
- Single key 'Extended Mode' selection (ie one key replaces the CAPS SHIFT and SYMBOL SHIFT function).
- Fully compatible with Interface 1 and most peripherals.

STONECHIP ELECTRONICS

Stonechip Electronics, Unit 9, The Brook Industrial Estate, Deadbrook Lane, Aldershot, Hants. Telephone: (0252) 333361

Extender unit available to use with Interface 2 and Kempston Joystick Interface. £2.50.

£59·95

DEALER ENQUIRIES WELCOME
Delivery approximately 28 days

To: Stonechip Electronics, Unit 9, The Brook Industrial Estate, Deadbrook Lane, Aldershot, Hants. Telephone: (0252) 333361

Please forward me the following products:

....

....

All prices are inclusive of VAT, Post & Packing for U.K. deliveries (overseas add 15%)

Name ....

Address ....

....

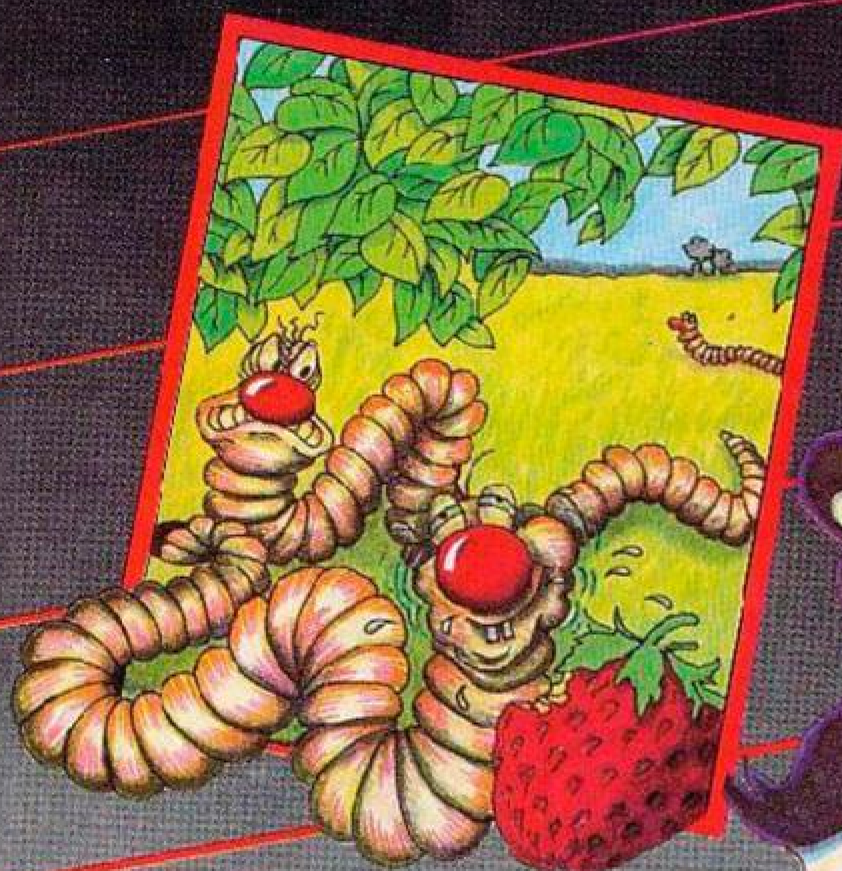


Please debit my Access Card Number

I enclose Cheque/PO for £

For The First Time Ever

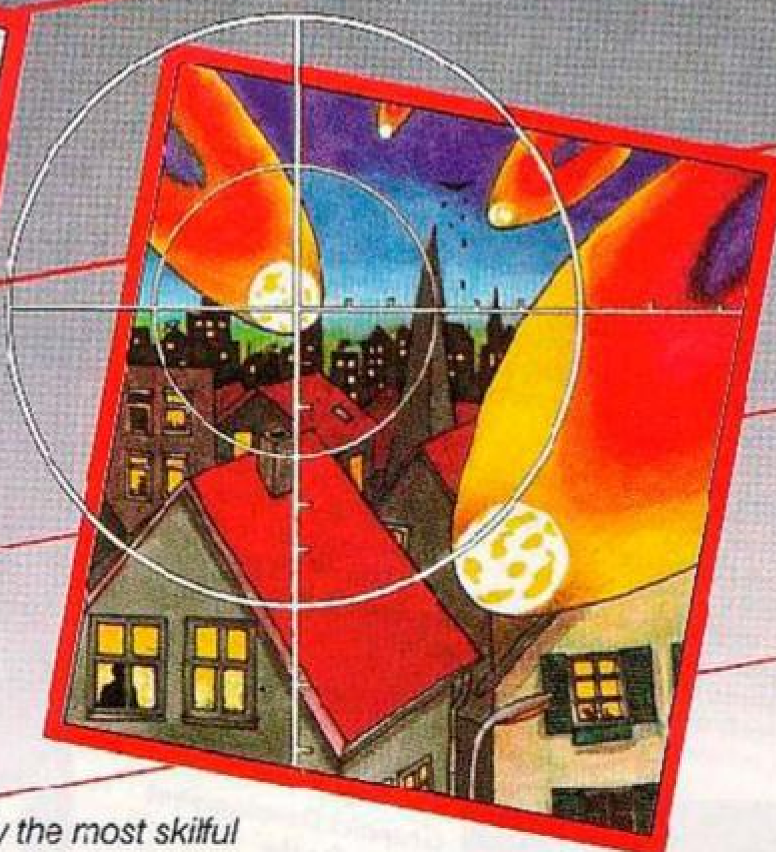
In England











PINGO

Battle in the ice maze with Pingo to destroy the Sno-bees. If you're fast enough you may survive!

ZX Spectrum 48k **5.95**

SPACE MISSILE COMMAND

Incoming waves of missiles and only you between the earth and destruction.

ZX Spectrum 48k **5.95**

JANGLER

A game for only the most skilful joystick adepts. Has to be experienced to be believed.

ZX Spectrum 48k **5.95**

MUSIC COMPOSER

- ★ 3 channel composer
- ★ professional musical notation
- ★ correct phrasing
- ★ 5000 notes
- ★ music sheet scrolled across screen or printer
- ★ fully editable
- ★ synthesizer coming shortly

ZX Spectrum 48k **6.95**

Available from your software dealer

profisoft

Dealer enquiries contact telex Germany 94966 profis d.

PROFISOFT GMBH, SUTTHAUSER STRAßE 50/52, 4500 OSNABRUECK, WEST GERMANY

THE KEY TO PROFESSIONAL GAMES DESIGN ON THE SPECTRUM 48K

THE GAMES LANGUAGE OF THE 80'S!

Now, without any knowledge of machine code, you can write fast, smooth, professional, totally original games and market them **without paying royalties**.
Even if you have already mastered machine code, we believe that the time and problems saved by writing in **White Lightning's** FORTH– based high level language could revolutionise commercial games writing for years to come.

IDEAL IDEAL is an Interrupt Driven Extendible Animation sub-Language. Once you have mastered IDEAL's easy to learn set of over 80 commands and just a little FORTH, you will be ready to produce arcade-quality games even if you don't know machine code. Up to 255 Sprites, each with its own user-defined dimensions can be moved around the screen (or memory), scrolled, spun, reflected enlarged or inverted with amazing speed and smoothness. Operations are possible between screen windows, Sprites and Sprite windows. Sprites can even stretch across several screens so those difficult scrolling landscapes that form the basis of so many games are easy to achieve. Sinclair's own sound and graphics commands such as CIRCLE, DRAW and BEEP are fully supported, and there are some unique collision detection facilities.

MULTI-TASKING Because **White Lightning** uses interrupts, you can effectively run two programs at once. This means of course, that games like Space Invaders and Defender can be written without complex timing calculations. So while one program smoothly scrolls the landscape, the second animates the other characters. This is undoubtedly one of White Lightning's most powerful features.

- Produces real machine code programs which run independently of White Lightning.
- A multi-tasking animation language AND a Sprite Development program together in one system-pack.

WHITE LIGHTNING

- Supplied with a FREE 16-minute demo, and a 130-page, easy-to-follow manual.

MARKETING AND PORTABILITY Although White Lightning uses an integer FORTH as its host language, programs can be written in a combination of BASIC, FORTH, IDEAL and machine language.
What is more, programs written in FORTH/IDEAL will be highly portable between the Spectrum and implementations under development for other popular micros.
When it comes to marketing your completed games, there's no problem either. In fact Oasis themselves will offer to market outstanding software.

SPRITE DESIGN White Lightning, comes complete with a separate 20K program for developing the Sprites used in the main system. Not only can you use this to design your own Sprites from scratch, it also comes complete with 168 pre-defined characters covering games like **Asteroids, Pac-Man, Assault Course, Defender, Space Invaders, City Bomber, Lunar Lander, Frogger, Centipede, Donkey Kong** and many, many more. These characters are ready to use or can be enhanced. And Sprites can be saved to tape between editing sessions before being finally loaded into the main program.



The High Level Graphics Development System for the SPECTRUM 48K .....

OASIS SOFTWARE

AND COMING SOON! the power of White Lightning on the COMMODORE 64!

If your local dealer doesn't stock White Lightning, just send off this coupon for our rapid-despatch service.

Please send me ___ White Lightning System Packs at £14.95 each. I enclose my cheque/P.O. for £______

Name: ______

Address: ______

Oasis Software 9a Alexandra Parade, Weston-super-Mare, Avon, BS23 1QT Telephone: (0934) 419921. Every product carries a lifetime guarantee. All prices include extensive manual, VAT and p&p.

24 Hour Access Tele-ordering on (0934) 419921.

YC 10

Twin Kingdom Valley

48k Spectrum

BUG-BYTE

It's easy to complain about advertisements. But which ones?

Every week millions of advertisements appear in print, on posters or in the cinema.

Most of them comply with the rules contained in the British Code of Advertising Practice.

But some of them break the rules and warrant your complaints.

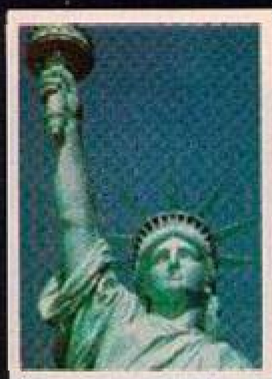
If you're not sure about which ones they are, however, drop us a line and we'll send you an abridged copy of the Advertising Code.

Then, if an advertisement bothers you, you'll be justified in bothering us.

The Advertising Standards Authority.
If an advertisement is wrong, we're here to put it right.

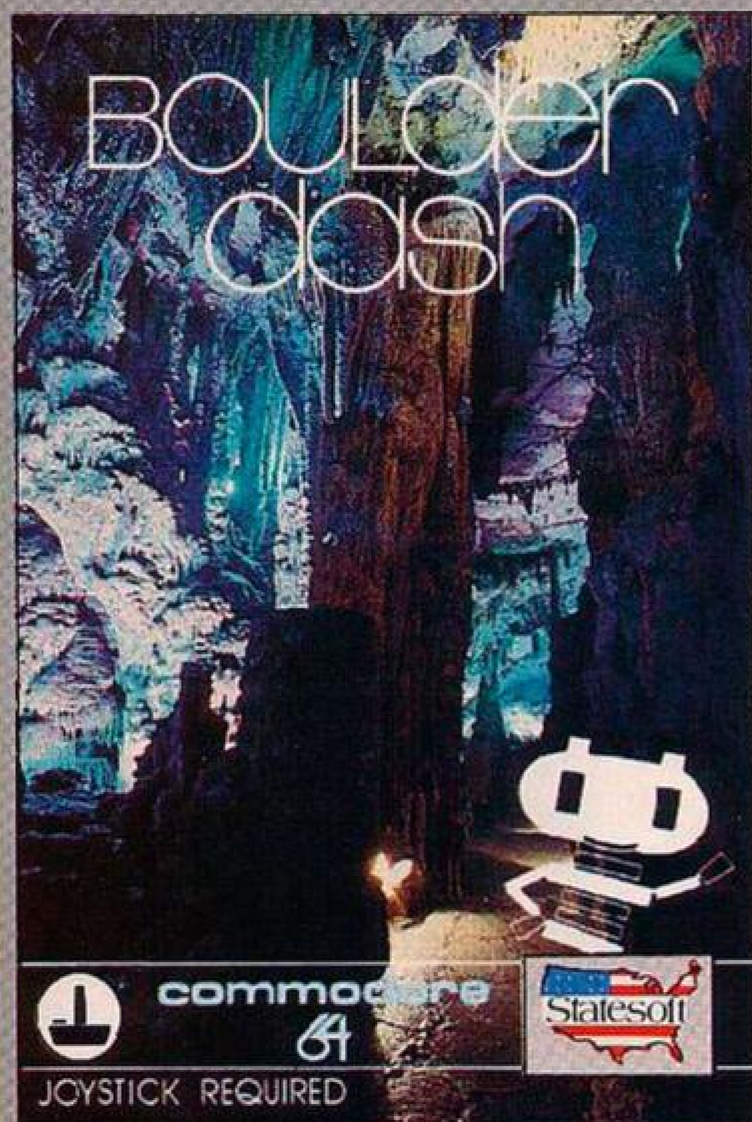
ASA Ltd, Dept 2 Brook House, Torrington Place, London WC1E 7HN

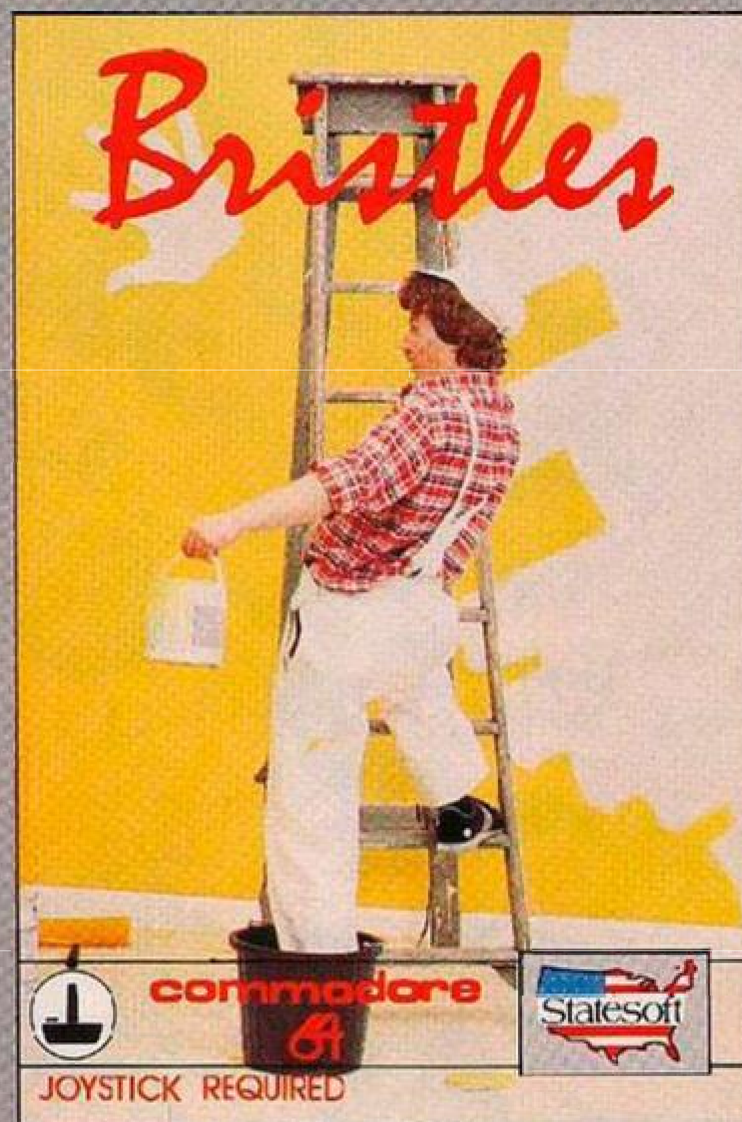
This space is donated in the interests of high standards of advertising.



AMERICAN

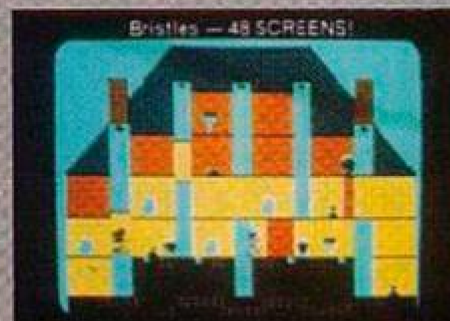
Big, Bold and Beautiful...





Starring Rockford
Clue:
You need strategy and planning to learn the 'Physics'.
16 caves scrolling screens.
Playable (Bonus Point) Intermissions
Limited lives and time.





48 Screens
Play in the Dark!
8 Player options
with
'Sex Select'

80 Screens

48 Screens

Cassette £8·95 Disk £10·95

I wish to pay by cash/cheque/Postal Order/Access
To ACCESS:-
I authorise you to debit my Access Account with the amount of £
My ACCESS No. is
Access
Name (as on Access card)
Cardholder's address
Signature

Really Something Else

STATE SOFT IN ASSOCIATION WITH  N.YORK. USA



STATE SOFT LIMITED, BUSINESS AND TECHNOLOGY CENTRE,
BESSEMER DRIVE STEVENAGE, HERTS.
TELEPHONE 0438 316561

One person alone could go with Pitfall Harry into the Lost Caverns... You!



Running on
Commodore 64, Sinclair Spectrum & MSX System at your usual software store.

Oh Harry. This time he's gone too far.

Somewhere, buried deep in the lost caverns of Machu Pichu, Peru, lies the stolen and, of course, priceless Raj Diamond, along with a hoard of missing gold bars.

Harry's little niece Rhonda and Quickclaw, her cowardly cat, are supposed to be with him, but they strayed away and are lost in the bowels of the caves.

A wealthy university has asked him, while he's cleaning this mess up, to capture an elusive stone-age cave rat.

What fun.

He just has to avoid the occasional poisonous frog.

Oh yes. And the wickedly clawed condors. The electric eels. And a very nasty line in thirsty vampire bats.

So you can see Harry could do with some help.

All you'll have to help you are your wits and some gas-filled balloons to bridge the wider chasms. And you'll be in for the game of your life.

One thing puts Activision Software out on its own. The way you go on running it month after month. And Pitfall II is no exception.

Lose yourself in the world of

ACTIVISION®

Activision Software is available at selected branches of: W.H. SMITH, BOOTS, RUMBELOWS, SPECTRUM and all good computer shops.

Why Buy Blind?

WHY INDEED?

If you advertise, it is like any other commodity – you need to know the measure you receive for your money

Our circulation figures are independently certified to strict professional standards administered by the Audit Bureau of Circulations

Accept nothing less

ABC

The Hallmark of Audited Circulation

ARE YOU THE HOME COMPUTER RETAILER OF THE YEAR? 1984



Micro Business, the monthly journal for computer dealers, and Websters Software are organising a major competition to find the Home Computer Retailer of the Year.

If you have an established, imaginative or particularly successful approach to home computer retailing, you could become the Micro Business Websters Software Retailer of the Year.

1st Prize £1,000 ◇ **2nd Prize £500** ◇ **3rd Prize £250**

This easy to enter competition is open to all home computer/ software dealers. To enter telephone 01-661 3687 to receive your entry form.

Phone now for your entry form.

Electrical Electronic Press, Marketing Department, Quadrant House,

The Quadrant, SUTTON, Surrey SM2 5AS.

YOUR COMPUTER CLASSIFIED

01-661 3036

Contact: Lucy O'Sullivan

ADVERTISEMENT RATES

Lineage: 50p per word (Min 20 words)
Box No: £4.00 extra
Linage advertisements are prepayable and the order form published in this section should be completed and returned with remittance. Credit Card facilities are available.

Display — rates per scc (Min. 2scc)

One insertion	:	£9.00
Three insertions	:	£8.70
Six insertions	:	£8.50
Twelve insertions	:	£8.00

Display advertisers should preferably reserve space by phone.

Copy Date

Closing date for Classified advertisements is the 24th Oct. for the Dec. edition.

Post to
Your Computer, Classified Department, Room H211, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Britain's Biggest Selling Home Computer Magazine

SPECTRUM CHESS

Dare you face The Turk

The original Turk was an eighteenth century automation, a life-size mechanical figure resplendent in Turkish costume and seated behind a wooden cabinet on which a chess board and pieces were placed.

OCP now offer you the twentieth century equivalent of that Turk — a chess-playing computer program. **The Turk challenges you to a game of chess!**



MANY OPTIONS INCLUDE:
- 6 Levels of Difficulty
- Demonstration Mode
- Board Editor
- Games Printout Facility
- Blitz Chess Against the Clock
- Two Player Mode
- Unfinished Games can be Stored
- Recommended Move

FULL INSTRUCTIONS PROVIDED
CHESS THE TURK ONLY £8.95
Post order to
Oxford Computer Publishing,
P.O. Box 99, Oxford.
134/4

PENFRIENDS. 118,000 members, 145 countries. SAE to I.F.F., P.O. Box 25, Shipley, BD18 2AP, England. 331

MICRODRIVE TRANSFER TAPE

At last **MAJORITY** of your software can be transferred to Microdrive, even auto-start commercially made games **WILL** run as intended.

* The **NEW 007 MD** cassette enables you to transfer the Headerless programs as well.

* Includes an intelligent Header Reader which tells **YOU** if any special actions required.

* Does **NOT** require an additional Help tape.

* Semi-Automatic. Fully automatic systems have proved limited.

How it works: Copies Code to the Microdrive using its push-button copier. **YOU** make a few very easy changes to the Basic loader part. Save it to Microdrive, and magic, **INSTANT SUCCESS.**

007 MD IS JUST £5.95
(Europe + 50p Other areas + £1.50)

SPECIAL OFFER: Membership of the **MICRODRIVE EXCHANGE** Newsletter club plus 007 MD for just £10. (Or on cartridge for £15).

ZX-GUARANTEED (Dept YC)
29 Chadderton Drive, Unsworth, Bury, Lancs. BL9 8NL.
Tel: 061-766 5712

N.C.R. 8130 computer, 4 x 8" disc drives, VDU, matrix printer, 64Kb C.P.U., payroll, sales ledger, stock control, £1000?, Melton Mowbray 822332. 413

VIC-20 Tape Copier. Copies almost all games, any RAM. Money back guarantee. £5.95. Griffiths, 8 Moss Close, Rugby, Warks. CV22 6SD.

LYNX COPY CAT

This is a collection of programs for serious and non-serious programmers alike. COPY CAT will Load/Save/Verify, with or without auto-run, m/c, basic, and multipart programs and make security copies at a different speed to the original. Two full disassemblers, DISM at ram top, DISE at the bottom of program ram, so that all of the coding can be examined. BREAK a short relocatable m/c program that activates the 'BREAK' key so that in the event of a program crash, or whilst a program is running a press on the key will return you to the monitor.

Send cheque/PO for £7.50 to:

AUTRAC COMPUTING
1 Fox Road, Mashbury, Chelmsford, Essex, CM1 4TJ

COMMODORE 64

R.B.S.
(Rapid Backup System)
Convert your single and multipart tape programs to turbo-load, faster than the Commodore disc drive. Each converted program will load independently of R.B.S. No pokes, no Sys. Calls, No User Knowledge required. Load "The Hobbit" in 120 secs. for personal use only. Cassette £7.50 inc.

Hypersave — 64
A versatile and flexible fast-loading utility. 8 additional basic commands. Save/Load/Verify up to 48K continuous RAM at Hyperspeed. Cassette £7.50 inc.

Backup — Deluxe
A powerful and user friendly security backup utility. Load/save all program parts continuously. Incorporates a sophisticated header reader. For personal use only. Cassette £3.50 inc.

Pro — Sprite
Sprite library. Design, manipulate, catalogue multi and single colour sprites. Create data. Joystick control. Packed with features. 100% machine code. Cassette £7.50 inc. Complete with your first Sprite library.

Special Discount Any two programs £9.95. All four £19.00 plus free! source! I/O guide with every order.

Cheque/P.O. or SAE to:
DOSOFT
2 OAKMOOR AVENUE
BLACKPOOL FY2 0EE

FAST DESPATCH GUARANTEED

QUICK SHOT II's £8.50

Microdrive Cartridges £4.25
COMPUTEC 135-137 Glasgow Rd, Glasgow, G69 6TA.
Tel. 041 771 0074 (p&p free)

SUPERIOR SPECTRUM TAPE COPIER

The **NEW 007 SPY** in the **ONLY** copier capable of copying even a full 48K Headerless program.

* Copies multipart programs all in one loading, automatically.

* Copies programs from 1 to 65279 bytes long. (Can yours)?

* Copies Headerless files up to a full 48K. (No other copier can).

* Copies **ALL** types Basic, Code, Screen, Arrays, Headerless.

* Guaranteed easiest to use.

007 SPY IS JUST £5.95
(Europe + 50p Other areas + £1.50)
(Please order as 007SN)

ZX-GUARANTEED (Dept YC)
29 Chadderton Drive, Unsworth, Bury, Lancs. BL9 8NL.
Tel: 061-766 5712

SPECIAL OFFER

High Quality Work Stations to Compliment Your Computer
Teak finish, with lockable storage and slide out shelving.
Size: 48"x20"x34½"-27" W/H
Priced at only £119.95 inc. p&p.
Send Chq. or P.O. to: Count Marshall Assoc., P.O. Box 2, Bromsgrove, Worcs., or send for colour brochure.

Lords of Midnight (Spec.)	£7.45
Sabre Wulf (Spec.)	£7.99
Pyjron (Spec.)	£6. 0
Jet Set Willy (Comm 64)	£6. 0
Beach Head (Comm 64)	£7.99
The Hulk (BBC)	£6.10

Write, ring, for full list, state comp.
TECHNIPLAY SOFTWARE
74 Dornock Drive, Hull HU8 8JL.
Tel. 0482 712958

TAPE COPIERS

Unique machine code programs to allow security backup copies of the majority of protected software available for:

COMMODORE 64	£5.95	ORIC 1	£5.95
VIC 20	£5.95	ATARI	£5.95
SPECTRUM	£5.95	BBC	£5.95
ELECTRON	£5.95		

ALL WITH FULL INSTRUCTIONS

HIGH SPEED BACK-UP

commodore

COMMODORE 64 owners ... the long wait is over — **FASTBACK** converts your software to **TURBO LOAD** — creates fast loading copies of most programs (single and multi-part) that run independently of the utility. For example: The Hobbit loads in 150 seconds with **FASTBACK**.
Supplied on tape with full instructions
ONLY **£9.95**

AMSTRAD

SPEEDMASTER is here. Allows choice of save speed. Creates fast loading copies of all software tested.
ONLY **£7.95**

TAPE TO DISK TRANSFER UTILITIES

Transfer games etc. to disk. Supplied on tape with full instructions for —

BBC	£9.95
ATARI (All models)	£9.95

COMMODORE 64
NEW IMPROVED VERSION **DISCO**
No user knowledge required. We guarantee this is the best available.
Still only £9.95

All prices include VAT, post & packing. Cheques, PO, or Phone your Card Number.

EVESHAM MICRO CENTRE
Bridge St., Evesham, Worcestershire
Tel: 0386 49641

SPECTRUM and DRAGON TAPE COPIER 5 and now MICRODRIVE 1

WE OFFER ON ALL PRODUCTS A FULL MONEY BACK GUARANTEE, an update service, and FULLY detailed instructions, with USER friendly programs. Match that!

TAPE COPIER 5 (TC5) makes BACK-UP copies of ANY type of SPECTRUM (16/48K) program (incl headerless, m/c, unstoppable) easily with MANY unique features.

MAXIMUM 5 STARS from H.C. Weekly (just like GRAPHICS and SOUND TOOLKIT — £5.50)

- LOADS in all program parts CONTINUOUSLY — even without pressing a key. Other copiers require many loadings — MASSIVELY saving you time and trouble! Maxbytes even manages a working copy of the full 48K.
- M/Drive — this extra option GENUINELY copies BASIC, M/CODE + arrays onto MICRODRIVE.
- Verifies. Repeat copies. Auto Abort. Program name plus HEADER data.
- Copies virtually ALL programs. UPDATE service for old customers, to keep pace with latest developments £1.50 (£2 with m/drive) + SAE + old TAPE.

MICRODRIVE ONE (MD1)

48K Spectrum owners with m/drive can NOW transfer the MAJORITY of their programs (inc headerless, long programs, + those with LOW addresses — say 16384).

TC5 transfers the bytes, but MD1 has 5 programs to HELP YOU get them running + 2 "CAT" housekeeping programs. Includes advanced header reader, program analysis, and other programs that produce the m/code you need. Manual has examples/exercises. UNRIVALLED!

Spectrum T.Copier £4.50 (or £5.50 with m/drive option). Dragon Copier £6.99. Microdrive One £6.50.

OVERSEAS customers add £1 Europe, £2 others for each product. Please send SAE for enquiries.

LERM, DEPT YC, 10 BRUNSWICK GDNS, CORBY, NORTHANTS.

Spectrum Markbook (48k)

A full teacher's markbook on computer. Holds all your classes; easily updated; automatic totals, percentages, orders of merit, mean & S.D. graphs etc. Now completely revised. More features than ever. £6.50 with manual and demo.

Mentor Software
69 Beech Rd, Halton, Lancaster

PROM SERVICES

ANALOGUE CONVERTERS
for ZX81 and SPECTRUMS

8 bit 8 channel input	£23.95
8 bit 3 channel output	£26.95
12 bit 8 channel input	£57.95
3 slot motherboard	£16.95

23/28 way edge cards 75p, connectors £2.50.

SAE for details of these and many other interfaces.

EPROM SERVICES
3 Wedgewood Drive,
Leeds LS8 1EF.
Tel. (0532) 667183

MAIL ORDER software: All the top names, popular games, cheapest prices. Fully guaranteed. Send SAE for free lists: Soft Select, 47 Ferntank Road, Redland, Bristol. 399

TURN MACHINE-CODE INTO BASIC

Turn Machine Code into Basic? Yes you CAN. Long machine-code progs are nearly all, all or part Basic.

MY STOP-REVEAL TAPE WILL:

- **STOP** virtually **ANY** Spectrum program, Basic, Code and even Headerless programs, protected or not, & **LIST**.
- **REVEAL** hidden Basic in machine code programs. *(Could be clues in Adventure games).*
- **LISTs** actual machine-code on your video.

Now you can **STOP, LIST, MODIFY, STUDY** most Spectrum programs at your leisure. Even 48K programs.

Includes: a **DISASSEMBLER, HEADER READER** and **SECRETS OF TRADE** pages explaining how professionals hide programs, and How to reveal them.

All for the price of one game!
Post £5.95 free
(Europe + 50p Elsewhere + £1.50)
392

KERR, 24/25 HIGH STREET, KING'S LYNN, PE30 1BP

TECTEL ROBOTICS

CONTROL BOARDS FOR HOME COMPUTERS

ORIC
ORIC DUUBRY £24
1 of 16 channel controller
ORIC ADC £34
Superfast 8 channel analog – digital scanner, 8 bit resolution
ORIC I/O port £39
15 programmable channels
ORIC PRINTER £95
25 col, matrix, graphics double sized print, ink & ribbons

ZX81
ZX81 DUUBRY £22.50
1 of 16 channel controller
SX81 ADC £34
Superfast 8 channel analog – digital scanner, 8 bit resolution.
ZX81 I/O port £34
16 programmable channels
ZX81 HI-RESOLUTION GRAPHICS £28
stunning results.

ITEXT SOFTWARE a new range of educational programs.

TODDLERS (pre school)
LEARN your ALPHABET
LEARN to COUNT
LEARN your COLOURS
LEARN your SHAPES
ABOUT the HOUSE
ABOUT the KITCHEN
ABOUT CLOTHES
£3.95 each

MUMS & DADS
ITEXT cooktook (English)
ITEXT cooktook (Chinese)
ITEXT cooktook (Italian)
ITEXT cooktook (Indian)
ITEXT Wine & Beer Making
ITEXT Cookbook Desserts.
ITEXT Cookbook Confection
£5.65 each

Send cheque or Postal Order to:

TECTEL
Telford Opportunities Centre, Halesfield 14,
Telford, Shropshire.
Tel. 0952-581738

P&P £1.50 for control boards £1 for tapes

MEGASAVE FANTASTIC SAVINGS

SPECTRUM	
DECATHALON (DALEYS)	5.80
FULL THROTTLE	5.95
JET SET WILLY	4.85
SABRE WULF	8.75
BEACH HEAD	6.95
OLYMPICON	4.95
MATCH POINT	7.55
LORDS OF MIDNIGHT	8.50
TORNADO LOW LEVEL	4.75
STAR TRADER	5.85
MONTE MOLE	6.95
STOP THE EXPRESS	5.55
WORSE H?N AT SEA	4.95
WORLD CUP	5.75
PSYTRON	6.50
RAPSCALLION	5.85
ATIC ATAC	4.50
MISSION 1	6.85
FACTORY BREAKOUT	4.95
AUTOMANIA	5.75
CHEQUERED FLAG	6.50
TITANIC	6.75
JACK & THE BEANSTALK	4.95
GIANTS REVENGE	4.95
FRANK N. STEIN	4.95
3D TANK DUEL	5.20
ANTICS	5.75
FIGHTER PILOT	6.40
NIGHT GUNNER	5.75
KOSMIC KANGA	4.95
MOON ALERT	4.95
FOOTBALL MANAGER	5.85
HEATHROW A.T.C.	6.85
WAR OF THE WORLDS	6.75
VALHALLA	11.00
BEAKY	4.95
AD ASTRA	4.95
MUGSY	5.95
MICRO OLYMPICS	4.75
CAVELON	4.95

SPECTRUM	
TRASHMAN	4.95
CODE NAME MAT	4.75
3D LUNAR ATTACK	4.75
BLUE THUNDER	4.75
FOREST AT WORLDS END	4.50
HOBBIT	10.95
CLASSIC ADVENTURE	5.75
TOWER OF EVIL	6.10
ORC ATTACK	6.10
QUILL	10.75
WHITE LIGHTNING	12.60
H.U.R.G.	10.95
DEV-PAC 3	10.50
TASWORD II	11.75
CURRAH SPEECH	27.75
VIC 20	
FLIGHT PATH 737	6.50
TOWER OF EVIL	5.45
COMPUTER WAR	5.45
SJB COMMANDER	5.45
TANK COMMANDER	5.45
CHARIOT RACE	5.85
BBC	
FRAK	7.75
MR WIZ	6.75
ZALAGA	7.75
STAR STRIKER	6.75
GISBURNES CASTLE	6.85
THE COUNT	6.75
FOOTBALL MANAGER	6.75
MICRO OLYMPICS	6.75
COMMODORE	
PITFALL	8.50
LORDS OF TIME	8.50
GILLIGANS GOLD	5.75
CAVELON	5.75
AUTOMANIA	6.85
WARLOCK	6.85
SHEEP IN SPACE	6.50
BEACH HEAD U.S.	8.50

COMMODORE	
JET SET WILLY	6.95
ZAXXON U.S.	8.75
SPITFIRE ACE U.S.	8.75
NATO COMMANDER U.S.	8.75
SOLO FLIGHT U.S.	12.00
STRIP POKER U.S.	8.50
FLIP FLOP U.S.	7.75
ASTRO CHASE	7.75
PETTY PIGEON	6.85
MONTY MOLE	6.85
HIGHNOON	6.85
P.C. FUZZ	6.50
ZAFGA MISSION	6.50
CATACOMBS	6.50
DECATHALON (DALEYS)	6.80
BEAM RIDER	8.50
EVIL DEAD	5.85
ARABIAN NIGHTS	5.85
HERO	8.50
DEATHSTAR INTERCEPTR	8.50
TRASHMAN	6.85
MISSION 1	7.55
ENCOUNTER	8.75
VALHALLA	11.50
ANDROID II	5.75
DARE DEVIL DENNIS	6.85
LOCO	6.50
FLIGHT PATH 737	6.50
BLACK HAWK	6.95
JACK & BEANSTALK	5.85
QUILL	11.50
FOOTBALL MANAGER	6.85
FORBIDDEN FORREST	7.50
AZTEC CHALLENGE	7.50
MICRO OLYMPICS	4.95
HOUSE OF USHER	5.85
HEATHROW A.T.C.	6.85
CLASSIC ADVENTURE	5.85
STAR TROOPER	5.85
HOBBIT	11.50

FREE POST — PLEASE STATE WHICH MICRO — FAST SERVICE
SEND CHEQUE/P.O. TO

MEGASAVE
Dept. B, 76 Westbourne Terrace, London W2.

SINCLAIR SERVICE CENTRE

We have the spares for all repairs to: Spectrum, ZX81, rampack printer etc. Also available Spectrum update 16K-48K. By post £27.00 inclusive (issue 2 & 3 boards) SAE enquiries to: Quantum, 33 City Arcade, Coventry, West Midlands or Phone Coventry (0203) 24632.

HOME ACCOUNTS

Put your house in order! Probably the best home use for your computer! Comprehensive coverage of bank accounts, credit cards, HP, etc. Inbuilt accuracy check for all transactions. Project cashflow for any period ahead. Available for CBM 64 or Vic-20. £7.50 or free details from:

DISCUS SOFTWARE
FREEPOST, Windmill Hill
Brixham TQ5 9BR
Tel: 080 45 55532

COMPUTER COVERS

Vic 20/64, BBC and others at £5.99 inclusive p&p. Send SAE for sample beige leather-look material and order form.

Box No. 415

ARROW MICRO SERVICES
— Commodore 64 —

ARROW TURBO-SAVER
Fed up with waiting for those programs to load.Well you need Turbo-Saver,easy to use and faster than the 1541 disk drive,programs reload independent of Turbo-saver..................£7.00

ARROW DISKOPY
This selective disk copier will copy both PRG and SEQ files faster than 1541 back-up and you dont need to copy all the disk,very user friendly and easy to use....................£7.00

ARROW TRANSFER
Transfer your favourite games to disk both multi part and Auto Runs,works with most software..........£7.00

ARROW DISK-DOCTOR
Now you can recover scratched files easily,edit any byte on any block in Hex or Alpha,alter programs,edit the directory,format disks......£8.00

ARROW MICRO SERVICES
20 Portmeadow Walk
London SE2

CONTRACT BRIDGE

SPECTRUM 48K and COMMODORE 64

Complete Contract Bridge single-handed against your Spectrum or Commodore 64. Random hands. Unsurpassed bidding and play. Full scoring. Unlike others, this takes the game seriously. Did you know our major rival cannot even play as declarer?!! Here you play exactly as you would with friends......if you want. Otherwise, choose amazing options not in lesser programs:

- Define your own hands
- Display everyone's cards
- Make computer bid or play for you
- Lay down a hand
- Re-bid or replay any hand
- Change sides
- Bid all four hands yourself
- Play all the cards yourself

It must be good to offer so much. Why settle for less? Send or phone today.
£9.95 (cheque or Barclaycard or Access) fully inclusive. Only available direct from us, by return.

CONTRACT BRIDGE — the definitive name on the definitive game.

VISA



HIGHLIGHT SOFTWARE
3 Nether Court, Halstead, Essex CO9 2HE. Tel. (0787) 475714

DISKount PRICES

5¼" SS/DD Diskettes	£1.50
3½" SS/SD Diskettes	£4.50
2000 Sheets (11"x3½") Listing Paper	£16.00

CASSETTES: C15 70p
C20 60p C30 70p
(Case/Labels Inclusive)

- 1 Year Guarantee
- p&p free: Delivery 7 days
- Further discounts available
- We supply schools & colleges

Cheques/P.O.'s to:
C & S Computer Services
144 Sutcliffe Avenue, Grimsby
Sth Humbs. DN33 1AP

THE TRIAL OF
ARNOLD BLACKWOOD
A New adventure of intrigue
for the AMSTRAD 64
(also available for DRAGON 32) £5.50
inc. (state micro)
NEMESIS
0 Carlow Road, Ringstead,
Kettering, Northants NN14 4DW.

DRAGON 32 CASSETTE COPIER

DUPLICAS £7.95inc

(Please add £1 for orders outside the UK)

Cheques and POs made payable to:

QUICKBEAM SOFTWARE
67 Old Nazeing Road
Broxbourne, Herts EN10 6RN

Previous customers please send old tape - £1.50 for latest version

---

MICROBASE
HOME COMPUTER SOFTWARE

		P.R.P.	Our Price
Monty Mole	CBM	7.00	6.66
Monty Mole	Spec	5.99	5.75
Decathlon (Daleys)	CBM	7.95	6.55
Decathlon (Daleys)	Spec	5.95	5.65
Ropasollion	Spec	6.96	6.75
Astro Chase	CBM	8.95	7.55

Latest software at amazing discount prices. Write or telephone for price list. To order send cheque/P.O. to:
MICROBASE, P.O. Box 28,
Newcastle NE3 1NG
Tel. 091 285 9855
(24 hr. ans. machine)

ATMOS aide memoire includes page 0, page 2, loading/saving routines, Oric 1/Atmos ROM conversions and tape copier for Atmos. All this for £5 to S.S.S., 23 Nidderdale Place, Bramley, Rotherham, S. Yorks. S66 0LF. 385

SPECTRUM SOFTWARE CLUB!

LOWEST COST **FREE CASSETTE!**

- ★ Hire and Exchange games from just 50p
- ★ Buy new games at the best possible discounts
- ★ Hundreds and hundreds of games to choose from
- ★ Regular Newsletter with details of new releases etc
- ★ Every new member gets a FREE BLANK CASSETTE!
- ★ All the benefits of other clubs at HALF THE PRICE!

Send just £3.95 and we will rush you your Membership Kit and Free Cassette:

SPECTRUM SOFTWARE CLUB (YC)
287-291 HIGH STREET, EPPING, ESSEX CM16 4DA
(or send a stamp for catalogue)

AMSTRAD SOFTWARE

AMSOFT	Retail Inc.	Our Price	Ex. VAT
EDUCATIONAL & ARCADE	8.95	7.96	6.92
WORD PROCESSING	9.95	8.95	7.78
INTRO TO BASIC PART	19.95	18.95	16.48
HOME BUDGET SPREADSHEET	19.95	18.95	16.48
PASCAL	34.95	33.00	28.70
ASSEMBLER/DISS	24.95	23.75	20.65
WORDMANIA	8.95	8.00	6.96
HAPPY NOS	8.95	8.00	6.96
WORLD WISE	8.95	8.00	6.96
ANIMAL/VEG/MINERAL	8.95	8.00	6.96
MAP RALLY	8.95	8.00	6.96
HOME RUN	8.95	8.00	6.96
SULTANS MAZE	8.95	8.00	6.96
SPANNER MAN	8.95	8.00	6.96
OH MUMMY	8.95	8.00	6.96
LASER WARP	8.95	8.00	6.96
CODE NAME MAT	8.95	8.00	6.96
TIME MAN 1	8.95	8.00	6.96

AMSOFT	Retail Inc.	Our Price	Ex. VAT
TIME MAN 2	8.95	8.00	6.96
HAPPY LETTERS	8.95	8.00	6.96
HAPPY WRITING	8.95	8.00	6.96
HAMMER ATTACK	8.95	8.00	6.96
ROLAND IN CAVE (FREDDY)	8.95	8.00	6.96
ROLAND ON ROPE (BUGABOO)	8.95	8.00	6.96
GEMS STRADUS	8.95	8.00	6.96
CHESS	8.95	8.00	6.96
HUNT HEDGES	8.95	8.00	6.96
XANAGRAMS	8.95	8.00	6.96
HUNTER KILLER	8.95	8.00	6.96
ALIEN BREAKIN	8.95	8.00	6.96
ATOM SMASH	8.95	8.00	6.96
ELECTRIC FREDDY	8.95	8.00	6.96
ADMIRAL GRAF SPREE	8.95	8.00	6.96
CRAZY GOLF	8.95	8.00	6.96
PUNCHY	8.95	8.00	6.96
CUBIT	8.95	8.00	6.96

P & P on Software Free. Write for Free list. Cheques/P.O. to:

MICRO COMPUTER WORLD
1 Lane Close, London NW2 6QZ

ATARI 400/600/800/XL

Cartridge Backup System
Backup 8/16K cartridge to tape and disc 400/800 with 48K ram. De luxe version has gold edge blades on cartridge simulator.
Cartridge to tape & disc £15.00
de luxe £20.00
Spare simulator board £12.00
de luxe £17.00

XL Cartridge Backup
600 XL £25.00
800 XL £30.00
Specify Tape or Disk

Tape Duplicator
Duplicate almost any single or multistage tape. BASIC program. 48K ram recommended.
Tape Duplicator £6.00

Fast Loader
Reduce tape loading time of almost all of your single multistage tapes by up to 49%.
Fast Loader £6.00

600 XL Memory Upgrade
Upgrade your 16K to 64K. Complete kit with full instructions.
Memory Upgrade £25.00

Services
Listing and prom blowing services also available. Send for details.

Send large SAE for further details on any/all of the above and new products. All prices are inclusive of p&p. Utilities are for 400/800/XL/800XL unless otherwise specified.

S. Terrell
17 Cock Close Road, Yaxley,
Peterborough PE7 3HJ

Q L Software

Sahara Quest
AVAILABLE NOW
Supplied on
Microdrive
@ £10.95 each

H. Gostling,
45 Aintree Close,
Newbury, Berks.

COPYMATE TWO

Commodore 64 tape back-up utility. A professional product with an *EXTENDED RANGE* and the ability to *SAVE TO TAPE AND/OR DISK*. Supplied on a quality cassette with full instructions for only £5.75 or on disk for only £7.75.

64 MONITOR

For the CBM 64. Designed for both the beginner and expert m/c programmer. Supplied with a 40 page explanatory manual. 14 useful commands including a built-in assembler/disassembler. Tape only £5.95 or disk for £7.95.

HORIZON SOFTWARE
15 Bamburg Close
Danesholme, Corby, Northants
NN18 9PA.

SOFTWARE HOUSES! PROGRAM WRITERS!

PUT SOME STING IN YOUR PACKAGING!

If you're not happy with the appearance of your packaging—simply send us a sample, with any relevant information. We will return it—together with our ideas for improvement (in the form of a colour 'Rough'). No obligation. Quotations included for artwork & printing 500 or 1000 copies. The Complete Service. *Also Logo design & Advertising Promotional material. All enquiries welcome...*

Finished Art Service Team

762 766 Wilmslow Road,
Didsbury,
Manchester M20 0DE.
Tel 061-434 2779

BECOME A PROGRAMMER

Improve your prospects in the industry of the 80's. We'll develop your skills more quickly and more professionally with our home study Programming Course, based on Spectrum. Write for Free brochure.

IDEAL SCHOOLS
Ref: YC3 Freepost Woking,
Surrey GU21 4BR.

STUDY Bookkeeping and Accounts at home using our 'O' level cassette course. Also short courses on computer programming, wages, PAYE, VAT. Trevor Burton, Bunbury, Cheshire CW6 9SX. Tel. 0829 230863. 338

STOP—REVEAL

A unique cassette for the 48K Spectrum, Genuinely lets you:

1. STOP virtually all programs, BASIC, MACHINE-CODE and even HEADERLESS-FILES protected or not.
2. REVEALs the hidden Basic in Machine-Code programs. (Could be clues in adventure games).
3. LISTS actual Machine-Code on your video.

Now you can STOP, LIST, MODIFY, STUDY most Spectrum programs at your leisure. (And cassette is Microdrive compatible).

Includes a DISSASSEMBLER so can even study Sinclair ROM, etc, plus the most Advanced HEADER-READER ever written, plus pages of SECRETS OF THE TRADE explaining professional methods used to hide lines/programs, etc.

YOU CANNOT GET A MORE POWERFUL CASSETTE

(Even STOPS/REVEALS programs which are a genuine 48K long)

POST £5.95 FREE
(Europe add £1. Other areas add £2)
KERR, 24/25 HIGH STREET,
KING'S LYNN, PE30 1BP.

BLANK CASSETTES

Rely on the professionals for guaranteed top quality computer/audio cassettes at great value budget prices. Packed in boxes of 10, complete with labels, inlay cards and library case.

Prices include VAT, post & packing

Length	Box Price (10)	Qty.	Value
5 mins (c.5)	£4.35		
10 mins (c.10)	£4.40		
12 mins (c.12)	£4.45		
15 mins (c.15)	£4.50		
30 mins (c.30)	£4.70		
60 mins (c.60)	£5.30		
90 mins (c.90)	£7.00		
			£

Cheque/Postal Order enclosed for

TRADE ENQUIRIES WELCOME. GET BEST TERMS, SERVICE & PRODUCT, BUY DIRECT FROM MANUFACTURERS OF PROFESSIONAL BRAND CASSETTES

NAME ....

ADDRESS ....

....

PROFESSIONAL MAGNETICS LTD
(Dept. CCC), Cassette House, 329 Hunslet Road, Leeds LS10 3YY
FREEPOST Tel: (0532) 706066

RETAILERS

For fast speedy distribution service contact Drake Distribution on 0752 500951/2

We can offer you:
- 24-hour delivery in UK
- The Best Discounts
- Starter packs available
- All the latest software
- Personal weekly delivery service throughout the UK
- Export enquiries welcome
- 48-Hour delivery can be arranged

As retailers ourselves we know the titles that sell — Phone or write for a price list now.

DRAKE DISTRIBUTION
Unit 45, Enterprise Plymouth,
Somerset Place, Plymouth PL3 4BB

WHAT PRICE SUCCESS FOR YOUR CHILD?
SPECTRUM/BBC

Carefully constructed programs, designed by teachers, to motivate and explain those difficult but essential concepts

CHEMISTRY

1. Formula Package
Good Software Guide: "Simple, well thought out and well presented, it succeeds admirably in its intention"

2. Reactions
Micronet: "Well designed and executed"

3. Titration Package
PCW: "Excellent teaching aid"

NEW

4. Write Equations
Everything you need to know about writing Chemical Equations

5. MOLE: Chemistry Calculations

6. Periodic Table
Prints table! Explanations and educational game

PRIMARY

7. Countdown
5 superb programs: Numeracy skills, money, recognition, money, and association

All available for Spectrum 48K for £5.50 per program
Formula package also BBC B — Cassette £8.50

CLOUD 9 SOFTWARE
Dept. YC6, 4 Dolvin Road, Tavistock PL19 9EA. 373

AMSTRAD COMPUTER DUST COVERS

Made in one piece, from matching proofed anti-static nylon. Piped in green with Amstrad CPC 464, printed keyboard section £5.95. State mono or colour.

BBD Covers
39 Manse Ave.,
Wrightington, WN6 9RP.

THE PUNTER'S PAL COLLECTION

Starters Orders — A simple to use horse race predictor. Producing 67% success rate on top-tips. Suitable for both National Hunt or Flat races. On each predicted horse an easy to understand rating is given.

Controlled tests have shown that the program consistently beats ANY tipster in ANY newspaper. Simply enter form from any Daily Newspaper. Now with dual and straight forecasts, and tricasts. The least expensive such program on the market at only £6 inc. p&p.

Also HARE'S RUNNING — as with Starter's Orders but for use with greyhound racing for £5.

BUY BOTH PROGRAMS FOR £10.

Both programs are available for any Spectrum or Commodore 64. *(please state which).*

Orders to: **David Jackson, 1 Osborne Place, Todmorden, Lancs. OL14 5BQ.**
(Or send SAE for more details)

SPECTRUM KOPYKAT

Simply the best. Copying any 16/48K Spectrum program is as easy as LOADing & SAVEing your own programs. Even unstoppable programs can now be backed-up onto a fresh tape. Only £4.95
IT CAN EVEN COPY ITSELF

NEW

MICRODRIVE KOPYKAT

Transfer your cassette based software onto the ZX Microdrive RELOCATES programs. Stops & reveals programs ESSENTIAL for M/C transfer. Only £4.95.
Both with FREE Header Reader
Despatched by Return of Post.

MEDSOFT
PO Box 84, Basingstoke, Hants

Programming the
PET/CBM
By Raeto West

The Reference Encyclopedia for Commodore PET and CBM Users

Comprehensive teaching and reference book on programming Commodore's 2000, 3000, 4000 and 8000 microcomputers and peripherals.

Many programs, charts and diagrams. 17 chapters, appendices, and index. iv + 504 page large-format paperback. ISBN 0 9507650 0 7. Price in UK and Europe £14.90 each (includes post and packing). 48 hour order turnaround guaranteed.

From dealers and booksellers or direct:

Trade Manager, Edward Arnold (Publishers) Ltd, Woodlands Park Avenue, MAIDENHEAD, Berks SL3 3LX.
Tel: (062882) 3104

"A masterpiece" — *Creative Computing*
"Essential" — *Educational Computing*
"Excellent" — *Jim Strasma*
"Comprehensive & accurate" — *Jim Butterfield*

Send orders and make cheques payable to:
Trade Manager, Edward Arnold (Publishers) Ltd, Woodlands Park Avenue, MAIDENHEAD, Berks SL3 3LX

Send .... copy/ies Programming the PET/CBM at £14.90

I enclose cheque/PO for £............

NAME............

ADDRESS............

ATTENTION!

Are you Baffled by BASIC
Confused by Computers
Mystified by Machine Code
LET US HELP YOU

We are arranging computing courses from October 1984.

Places are strictly limited so write or 'phone for details today.

Crescent Software
3 Rolfe Crescent Heacham Norfolk PE31 7SF
(0485) 70865

DUST COVERS. Quality anti static material. Spectrum £1.50, OK Tronic, Commodore, BBC Dragon £2.50 inc. p&p also available for printers cassetted disc drives etc. Computa Covers, 17 Lichfield, St. Wolverhampton, West Midlands. 407

QWERTY makes early learning fun for your child. Match the letters to earn a smile and tune. Written for 3-6 year olds, makes full use of sound and graphics. Plus — QWERTY GOES COUNTING. Both programmes on single cassette for SPECTRUM 48K only £5 inc. p&p, despatched by first class return. Cheque/P.O. to: A. Hackett B.Sc., 60 Margaret Grove, Harborne, Birmingham B17 9JL or s.a.e. for full details.

VIC TAPE BACKUP will backup most Vic-20 programs, in BASIC, machine-code, or both. Detailed instructions are printed on the card inlay. VIC Tape Backup is easy to use, with prompting by colour and by sound — when the colours change and the tone sounds, the copier is ready! Load errors are signalled, so poor originals can be tried again. Works with all memory configurations — one machine-language program allows automatically for memory differences! Send crossed cheque/PO for £7.95 to **Level Software Ltd, PO Box 55, Shirley, SOLIHULL B90 4SL. Tel: 021-643 6728.**

ORIC 1 Single joystick interface. Atari compatible joysticks, software programmable for any keys. Operates some commercial games. £9.99 inclusive. Marder Electronics, 26 River Close, Abingdon, Oxon.

Very short but powerful programs
Strongly recommended by educational authorities

EDUCARE'S 50
Book of fifty programs for primary education

Spectrum ZX81 (1K) £5.95 BBC Micro/Electron £7.95

EDUCARE 139a Sloane St., London SW1X 9AY.

TOP PROGRAMS, TOP DISCOUNTS

Spectrum 48K: £4.95 AHHH!, Cavelon, Dartz, Factory Breakout, Gilligans Gold, Hyperblaster, Olimpimania, The Frize, 3D Tank Duel, T.L.L., Worse Things Happen at Sea.

£5.95 Automania, Dale, Thompson Decathlon, Eye of Bain, Full Throttle, Giants Revenge, Monty Mole, Nugsy, On the Oche, Rapscallion, Star Trader, World Cup Football.

£6.50 Chequered Flag, Fighter Pilot, Psytron, War of the Worlds, 3D Lunar Attack, Heathrow, Nightflight 1.

£6.95 Match Point, Shuttle, Flight Simulator.

£8.50 Lords of Midnight, Hulk Adventure, Sabre Wulf.

Oric 48K: (All Atmos compatible)

£5.95 Digger, Harrier Attack, MARC Mined Out, Pasta Blasta, Scuba Dive Spooky Mansion, Velsors Lair.

£6.50 Ghost Gobbler, Invaders, Krocadile Waltz, Lunar Mission, Probe 3, Green Cross Toad.

£6.95 Classic Racing, Defence Force, Rat Split, Ultima Zone, Zenon 1, Zorgons Revenge.

Dragon 32:

£5.95 Hunchback, Kriegspiel, Ugh, Zaksson.

£6.50 Devil Assault, Dungeon Raid, Mr Dig, Cuthbert in Space, Morocco Grand Prix, Touchstone, Red Meanies, Lazerzone, Mystery Java Star.

£8.95 Buzzard Bait, Dragon Chess, Fishy Business, Micro Olympics (BBC, CBM 64, Electron, Spc) £4.95.

Prices incl. p&p (Europe + 50p others + £1.00). Ch/PO to: **O. J. Software (SAE for list, state machine), 273 Moss Lea Road, Wrightington, Wigan, Lancs. WN6 9RN. Tel: (0257) 421915 for price on latest releases.**

BBC disk duplicator. Back-up protected dual format discs. 1 or 2 drives. Acorn or Watford 1.3 DFS £8.95. M. Spurr, 13 Avenue, Trimley, St. Mary, Ipswich IP10 0TT. 395

Spectrum Repairs

£16.95 inclusive of labour, parts, p&p etc. ZX81 for £11. Fast reliable service. (Av. repair 24 hrs) by qualified engineers. Send computer only to:
HS COMPUTER SERVICES
2 The Orchard, Warton, Preston, Lancs. PR4 1BE Tel 0772 632686 or 631897

QL USERS. Centronics printer interface £45. Shinwa CP-80 printer £219.95. MMS, 75 St. Margaret's Road, Bradford BD7 2BY. SAE for full list. 401

TIMES PORTFOLIO "BINGO". Prog. Spectrum ZX81. Computer/files/prints data. £3.50. Brian, 2 Taylor Green, Oldham, OL4 4SE. Tel. 061 352 5038. 382

ORIGINAL programs urgently needed Oric and Commodore 64. Educational or Games. Cash payment or royalties. Professional ethics strictly adhered too. Send your program for consideration. Knight Products (UK) Ltd. 71 Colne Road, Earby, Lancashire BB8 6XL. 257

VIC-20 USERS
Cartridge and Cassette Back-up

Protect your software investment — Save Cartridge & port wear Backed-up cartridges run like originals — Customise your machine.
Victrix 1: Cassette Back-up (5 ways)
Victrix 2: Cartridge Back-up onto tape!
Victrix 3: Reset & Slot Power Add on's

Send £2.50 each or £6 for all 3 to:
M. Parker, 52 Laurie Avenue, Forest Fields, Nottingham NG7 6PN.
(Mail order only please)

DO IT WITH TRANS-EXPRESS

TAPE TO MICRODRIVE — MICRODRIVE TO TAPE

Would you like to transfer your Spectrum programs from
① MICRODRIVE TO MICRODRIVE ③ TAPE TO TAPE
② TAPE TO MICRODRIVE ④ MICRODRIVE TO TAPE

Then do it with

TRANS-EXPRESS

TRANS-EXPRESS is the most comprehensive package of four ent. utilities for transferring Spectrum programs. They are user friendly, simple to use, reliable & very efficient. They go much beyond where similar attempts failed, enabling you to transfer any kind of programs up to the full 48.0K length - provided you do not infringe copyright. TRANS-EXPRESS is an essential microdrive companion and an invaluable software back-up utility.

We are offering the entire package for £9.95 or a combination of TAPE TO MICRODRIVE & MICRODRIVE TO MICRODRIVE for £7.50. You can also buy each of the four programs separately for £5.50 only. 224

TAPE TO TAPE

Please send me a copy of TRANS-EXPRESS ① ② ③ ④ Please tick where applicable. enclose cheque/PO for .... YC
(Please add £1.00 for orders outside UK)
Name ....
Address 215

ROMANTIC ROBOT 113 Melrose Ave, London NW2

AMSTRAD

Zedis Editor and Disassembler for the Z80

Includes full instructions for disassembling ROMs — £6.95

PRIDE UTILITIES, 7 Chilton Heights Chalton, Luton, Beds.

* BACK-UP SYSTEM FOR *
*CBM-64 VIC-20 *

The BACK-UP BOARD is the latest, fastest, and most unique way to back-up your tape programs. With this board you can connect a second CBM tape deck to your computer. You can copy a program on the second deck while it loads from the first. You can back-up m/code, turbo loaders, data files etc.

TRIGSOFT is the only company in the UK to offer such a system for CBM-64 and VIC-20 owners.

BACK-UP BOARD for CBM-64 + VIC-20 £10 inc. p&p.

TRIGSOFT
Marshfield House, 4 Burnett Place, Marshfields, BRADFORD BD5 9LX.

COMPUTER BOOKS

To help you write better programs

SPECTRUM

Adventures.....£5.95
Machine Code Applications.....£6.95
Master Your Microdrive.....£6.95

COMMODORE 64

Adventures.....£5.95
Machine Code Master.....£6.95
Advanced Programming Techniques.....£5.95

DRAGON 32

Games Master.....£5.95

Other titles/machines also available SAE for details. Please add postage book 75p, additional books + 30p each.

JAMES ELECTRONICS
P.O. Box 2 Rothwell, Leeds LS26 0UY.

VIC-20 Software Hire

Free membership. 500 Members. 100 titles from 50p per week. SAE for your free Membership kit to: **VSH (HCW), 242 Ransom Road, Mapperley, Nottingham.**

FREE

with "Your Team" a Bobby Charlton Leather Match Ball worth £6.99

A must for all soccer enthusiasts

Yes, absolutely free for a limited period with every copy of the program "Your Team" a real leather Match Ball autographed by Bobby Charlton (R.R.P. £6.99). "Your Team" is a database program to record and analyse your favourite teams match results, scores, attendances, statistics etc. All recorded in your clubs colours. Football league, Scottish league or your own team school or club can be kept season after season. Available for Spectrum, BBC, Electron, CBM 64 £6.95 plus £1.00 p&p. Order today enclosing cheques/P.O. Access/Visa to: Bec Sports, Dept YC, Bec House, Highlands Ave, Northampton. Tel: 0604 499 246.

EDUCATION

Whether it be SPECTRUM, ZX81 or BBC B, we hold in stock probably the largest range of educational software available, currently in excess of

50 DIFFERENT EDUCATIONAL CASSETTES

produced by the major software houses.

SAE for catalogue and SPECIAL OFFERS. Also GAMES TAPES: 3 for price of 2.

LOCATOR, 12, Fernhall Drive, Redbridge, Essex, IG4 5BN. Tel. 01-550 5575

MAKE YOUR OWN TV MOVIES

using

SPECTRUM 48K PROGRAM

Tape your movies and play back to amuse friends. ZX-81 and Spectrum morse-code reading progs.

for details:

PINEHURST DATA STUDIOS
69 Pinehurst Park. W. Moors
Wimborne, Dorset BH22 0BP

CONVERT your Spectrum software to interface 2 mode, for details and a SAE to 7 Mansfield Avenue, Eldwick, Bingley, BD16 3H.. 300

DISCOUNT MAIL ORDER SOFTWARE

ZAXXON.....£4.15
TRASHMAN.....£5.35
JET SET WILLIE.....£5.35
FOOTBALL MANAGER.....£6.25
MANIC MINER.....£5.35
THE BOSS.....£8.95
COSMIC CRUISER.....£4.95
SNOOKER.....£8.95

And more.
State title and machine
S.A.E. for lists.
Cheque/P.C. To Dept YC

Universal Publishing
65 Thurlow Park Rd.
London, SE21 8JP 415

New Releases

of computer software for the CBM64 BBC, Spectrum, Atari, new list every two weeks. Also software for the TI99/4A, Dragon, Electron, Lynx, Sharp MZ700, Tandy, Vic 20, ZX81. Please state computer business and games software.

M. J. SEAWARD
St. Olafs Road, Stratton, Nr. Bude, Cornwall.

QUICKDRAW FOR THE BBC (B)

Probably the easiest drawing program available. Use colour, lines, triangles, circles, add text anywhere, save/load and print displays. Single key commands with inkey. Superb for design work. Only £6.00 (incl).

Cheque to Selective Software. 64 Brocks Road, Street, Som.

The Publishers take all reasonable care to ensure that classified advertisements are genuine, but readers must satisfy themselves that they will be obtaining what they require before entering into transactions, particularly if they involve large sums of money.

SELL IT WITH YOUR COMPUTER

CLASSIFIED ORDER FORM

Classified Rates

Linage: 50p per word (Min 20 words) — prepayable

Linage advertisers should complete the form provided in BLOCK CAPITALS. Phone number counts as 2 words. Name and address to be paid for if used in advertisement. Box Number if required is £4.00 extra.

Display — rates per scc (Min 2scc)

One insertion	:	£9.00
Three insertions	:	£8.70
Six insertions	:	£8.50
Twelve insertions	:	£8.00

Display advertisers should provide separate copy and preferably reserve space by phone (01-661 3036).

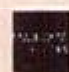
Method of Payment

Cheques etc, should be made payable to Business Press International Ltd, and crossed. I enclose herewith cheque/PO for

£.......................

Please debit my Access/Visa Barclay Card/American Express/Diners Club Intl /as below




SIGNATURE

Post to:

Cut out the order form and return together with your remittance to: Classified Department, Your Computer, Room H211, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. (01) 661 3036

Please insert the following advertisement in Your Computer Classified Section

					LINAGE
					—
					£10.00
					£12.50
					£15.00
					£17.50
					£20.00
					£22.50
					£25.00

No. of insertions required ☐ Box No. required YES/NO

NAME *(Please include initials)* ....

ADDRESS ....

....

....

Payment by credit card please state address card is registered

Daytime tel. no ....

THIS FORM SHOULD BE RETURNED BY 24th OCT. FOR DEC. ISSUE PUBLICATION

Company Registered Number: 151537 (England) Registered Office: Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Hot lines

Acorn Computer
Telephone: Cambridge 0223-245200

Atari
Telephone: Slough 0753-24561

Camputers
Telephone: Cambridge 0223-315063

Commodore CBM
Telephone: Slough 0753-74111

Dragon Data
Telephone: Eridgend 0656 744725

Sharp
Telephone: Manchester 061-2052333

Sinclair
Telephone: Cambridge 0276-68531

Sord
Telephone: London 01 930 4214

Tandy Corporation
Telephone: Birmingham 021-5566101

Texas Instruments
Telephone: Bedford 0234-63211

DATEBASE

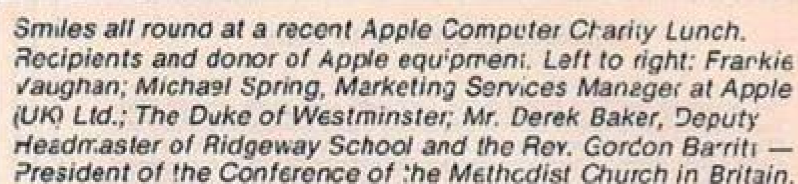
Local, national and international micro events are updated here. To publicise your event, phone Paul Bond on 01-661 3472.

Electron and BBC Micro User Show

Everything for the Electron and BBC Micro user, in this exhibition at Alexandra Palace, London. From October 25 to October 28. More details from Database Publications. Telephone 061-456 8383.

School Computer Fair

For anyone involved in education, except, of course, the pupils. Takes place at Bloomsbury Crest, London from November 6-7, then ups stakes to Manchester from November 14-15. More details from Publishers' Association. Telephone 01-580 6321.



Smiles all round at a recent Apple Computer Charity Lunch. Recipients and donor of Apple equipment. Left to right: Frankie Vaughan; Michael Spring, Marketing Services Manager at Apple (UK) Ltd.; The Duke of Westminster; Mr. Derek Baker, Deputy Headmaster of Ridgeway School and the Rev. Gordon Barritt — President of the Conference of the Methodist Church in Britain.

Compec

November 13-16 at Olympia. The big business computing exhibition sponsored by Computer Weekly, among others. More details from Reed Exhibitions. Telephone 01-643 8040.

INDEX OF ADVERTISERS



THE OFFICIAL

Eddie Kidd JUMP CHALLENGE



If you've ever wondered how it feels to be Eddie Kidd . . . defying danger and gravity, soaring on a motor-bike over a long line of cars . . . here's your chance to find out!

This fabulous new game – Jump Challenge – has been produced for you by Martech, with a lot of help from Eddie himself.

At the age of 12, Eddie Kidd was jumping over oil barrels on a bicycle. At 18, he shattered the world record with his astounding leap of 190 feet – clearing 14 double-decker buses. Can you match his skill, courage, control and ice-cool nerve? Jump Challenge will show how you compare with the King of Motor-Cycle Stunts!

Just like Eddie, you'll start by trying to clear barrels on a bicycle . . . gradually working up to attempting Eddie's daring leaps which have thrilled millions around the world!

- ☐ 100% machine code
- ☐ separate control of bike and rider for incredible realism
- ☐ dangerous headwinds for added difficulty
- ☐ scoring system – for successful jumps
- ☐ joystick or keyboard option
- ☐ PLUS!!! You can enter the Official International Jump Challenge Competition! Details on cassette insert.

Available from leading software retailers OR order today by mail, price £6·95 (48K Spectrum) or £7·95 (Commodore 64, BBC 'B', & Electron), including VAT and P&P. Please make cheque or postal order payable to Software Communications Ltd. Allow 7 days for delivery



SPECTRUM



SPECTRUM



CBM 64

martech

Martech is the registered trade mark of Software Communications Limited
Martech House, Bay Terrace, Pevensey Bay, East Sussex BN24 6EE



TRADE ENQUIRIES WELCOME. PHONE: (0323) 768456 TELEX: 87465 EXIM Brighton

48K SPECTRUM · COMMODORE 64 · BBC 'B' · ELECTRON